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EDITORIAL.

EUROPEAN CHRONICLES.

ELECTROCUTION.—In the May issue of the REVIEW I gave the information that a series of experiments had been started under the auspices of the *Société de Médecine Veterinaire Pratique* to observe the general manifestations exhibited by horses which had received a stroke from a continuous current of electricity, to establish the essential conditions to kill the animal and to find out the nature and the extent of the lesions which would be found at post-mortem.

Those experiments have been carried out, and the report has been made by Mr. L. Rossignol, secretary of the committee which regulated the whole work.

From this report, I send extracts, which are published in this issue, and which I hope will prove interesting to our readers.

The experiments have shown that some special conditions are required for a horse to be killed by even a very strong current—and that is that *contact should remain established* for some time with the poles giving the electric current. If on the contrary the contact is arrested immediately after the stroke has been received death will not only not take place, but the animal will rapidly recuperate from the effect ; and from this an important indication presents itself, viz. : *when a horse falls down and remains down, in contact with the pole, he must be*

dragged away from it at once, with all care, to avoid danger from the electric current.

I was personally very much interested in witnessing the first effect of the electric stroke. I have had an opportunity to see two horses who had been struck with lightning. One had recuperated from it, although he remained ailing for some time with paralytic effects, but in the other I saw death; he was in the position in which he had fallen at the time he was struck, viz., *with his fore legs flexed under him, his hind ones stretched backward and apart, and with the neck stiffened, the head was powerfully flexed upon it and the teeth were dug into the ground as if gnawing it with rage.* This very condition I observed again in the three animals that were knocked down by the electric current.

The result of the post-mortem has not been as satisfactory as had been expected. Nothing very positive, nothing pathognomonic could be found, but, as remarked by several of those present, this absence of characteristic lesions can be of great assistance in establishing an almost positive diagnosis as to the cause of death. Let us, for instance, have an animal who will present typical lesions of some form of other disease, and let it be exposed to an electric current insufficient to kill him on the spot; if his death occurs but a few hours or even a few days after, the electricity could not be considered as the direct cause of death. It is doubtful if it would be, even if he had died on the spot. But, again, let an animal receive an electric stroke, fall on the pole, remain in contact with it and die; the fact that there are no characteristic lesions of any kind, all other organs being sound, will be a strong, yes, a positive evidence, that electricity has been the cause of the fatality.

These results thus obtained by those experiments are of great value, specially in the cases where legal disputes are likely to occur in relation to the responsibility for the death of the animal, and I think they will prove of great advantage to veterinarians who as experts may be called to give their scientific testimony in such cases.

AZOTURIA—NEW TREATMENT.—Of all the diseases which practitioners hate to be called to treat, there is probably none which is more distasteful than azoturia. The forms of treatment which are resorted to are generally so unsatisfactory and the sequelæ or convalescence sometimes so severe and tedious that anything new which is likely to give better results must always be of interest. It is for that reason that I record the new treatment which I heard discussed at a recent meeting of one of the veterinary societies in Paris, after the reading of a paper on the subject presented by MM. Guillemard and Chigot.

This treatment, besides the general bleeding and revulsive frictions on the back, usually resorted to in French practice, consists principally in the administration subcutaneously of bromhydrate of arecoline, given in subcutaneous injections at the dose of 8 centigrammes, renewed twice a day. By this treatment the authors claimed four recoveries out of four cases occurring in a space of time varying between four and nine days.

If one takes in consideration that hæmoglobinuria is one of the diseases which occasion proportionately the greatest mortality, and against which in most cases the veterinarian remains powerless, such results, small as they may be in number, justify a fair trial. By its properties as a diaphoretic and by its action upon the intestinal tract, bromhydrate of arecoline is certainly indicated, and may prove very satisfactory. I do not know if bleeding and counter-irritation can be considered as good adjuncts, and I believe that in the States these are rather ignored, but if the arecoline salt has the power claimed for it by the French authors, there is no doubt that it can be combined to advantage with the milder forms which we use in America instead of venesection and counter-irritation, which give rise to so much struggling on the part of a poor paralytic animal, which by them is soon unnerved, exhausted, and too often covered with enormous bed sores.

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RABIES.—In their excellent work, "Maladies Contagieuses,"

Nocard and Leclainche write: "Contagion of rabies occurring always by inoculation of the saliva, it was of the greatest importance to establish at what moment of the evolution of the disease the saliva taken from the mouth is virulent. The inquiries of Nocard and Roux have shown that saliva is always virulent, 24 hours and sometimes 48 before the apparition of any change in the aspect of the dog. An animal may thus have all the external signs of health, eat, be lively, and yet carry in its mouth the virus of rabies."

Those facts are now well admitted. But a rather complicated question has just been asked in the *Progrès Vétérinaire* in relation to a peculiar case which is concisely related as follows: A young man was bitten by a dog which thirty-six hours before had himself been bitten by another, undoubtedly mad. The wound was a simple ecchymosis without cutaneous wound; the bite had been made through his pants, and there was no inoculation of saliva.

Was it necessary for the man to place himself under Pasteur antirabid treatment?

Not in his case—however, supposing that the tooth had penetrated the skin, what was the decision to take?

Two specialists who were consulted answered in the negative, on the ground that at the time the dog which did the biting was not in a rabid state, as long as that does not occur before the 12th day. But, yet, what had taken place during the 36 hours passed between the time he had been bitten and the moment he attacked the young man?

And then the question is put: Can it be said that 10 days after having been bitten, a dog cannot transmit the disease by biting? It would be risky. And, then, what after eight, after four, after two days, after *36 hours*, as it was in this case?

The question has been answered in the negative by Pasteur Institute. "And thus," say the writers of the article in the *Progrès*, "we do not object to be of the same opinion, and still we cannot avoid thinking that 10 minutes after inoculation the virus has penetrated the economy, and that accordingly in

the case where there would be a deep wound, positive inoculation of the saliva of a dog which is not in a rabid state but certainly carries in him the germs of the disease, it would be prudent to resort to the Pasteur treatment."

At any rate, the precaution could not be otherwise than wise. A. L.

THE CONGRESS ON TUBERCULOSIS.

The Congress on Tuberculosis was opened July 22 with great *éclat* before a very large number of members, adherents and delegates from all over the world. Out of some hundred and fifty foreign delegates the United States had sent thirty-eight, who represented the whole country, coming from the general government, Illinois, Michigan, Wisconsin, Massachusetts, Pennsylvania, Mississippi and New York. The American Veterinary Medical Association was the only registered veterinary organization represented from any country. The programme laid out by the Committee had been well prepared, and the work of the various sections was readily entered into by each, and reports presented and thoroughly discussed. The paper of Professor Dewar on "The Diagnosis of Tuberculosis in Animals During Life," was ably presented, and followed by an animated discussion, which occupied the morning of the second day of the Congress; and in the afternoon of the same day the great event of the meeting took place. It was the learned lecture of Professor Koch, which not only created a great sensation in Congress, but will no doubt give rise to important researches, and may for the present occasion some trouble to those who are engaged in the execution of the sanitary measures against tuberculosis.

No doubt our readers know already what has been the theme of the lecture of the eminent professor: "Human tuberculosis cannot be transmitted to cattle." Such is his conclusion. To make an analysis of this beautiful lecture and of the argument used by the professor would take more space than the REVIEW has at its present command. It will be better for our readers

to read the whole of it, as we reprint it from one of the advanced sheets obtained at the Congress.

Let me say, however, that the declaration of Professor Koch has failed to have the approval of many, presented as it was, and that it was not received with the conviction that the name of the great German savant would seem to have warranted.

Professor Nocard, of Alfort, replied to him, and before accepting the conclusions, which were upset by the simple exception of the abdominal tuberculosis of children, or *tabes mesenterica*, which is due to infection from tuberculous milk, he would recommend further inquiry. His remarks were loudly applauded.

Professor Bang, of Copenhagen, and Professor S. Wadhead, of Cambridge, spoke also in the same sense, and the excellent paper that Professor McFadyean read at a subsequent meeting was a powerful argument, which, with the accuracy and carefully made statements that are advanced by the author, will no doubt upset the apparent value of Professor Koch's new departure, if the many positive facts already existing were insufficient. We all know that Chauveau has proved by contradictory experiments that bovines can develop tuberculosis when lesions of the acute disease of man are fed to them. As Mr. Wm. Hunting remarks in the *Veterinary Record*, the present position relating to tuberculosis will remind one of the long controversy as to the identity of variola and vaccinia.

Notwithstanding, it is evident that the practical work and the execution of the sanitary measures which are taken all over the world cannot and will not be modified for the present, that it will require some time before the conclusions of the further inquiries demanded by such men as Nocard, Bang, McFadyean, and others, will be known. Our readers will no doubt enjoy the papers relating to this subject, and which I have sent first of all as the most interesting to veterinarians. A. L.

THE trotting record of the world was lowered the first part of August to 2.02¼ by the stallion Cresceus.

A GREETING FOR SEPTEMBER AND A PROMISE FOR OCTOBER.

The present month has by common consent and general adaptability been set aside in the veterinary calendar as the season for those delightful gatherings of the veterinary profession known as "association meetings." For the year 1901 they promise to be more than ever fraught with pleasure and profit to their adherents, and we predict greater numbers in attendance than ever before. The exactions of general practice during the past year have exceeded any other period within our memory, and the abundant prosperity of the members throughout the country is a sure indication that they deserve a respite from its routine, while the autumnal gatherings offer so much of profit and pleasure that it has become a custom to unite the delights of the annual outing and the benefits of the association meetings into one grand occasion.

We, therefore, extend our greetings to the veterinary hosts everywhere, and trust that September, 1901, may be a red-letter month for the good that shall be accomplished, not only to professional advancement, but to personal happiness and health.

The REVIEW promises to all its readers who for one cause or another cannot avail themselves of these great opportunities, that they shall have the next best thing—a faithful record of all that transpires at the various meetings.

PASSING OF THE AUTOMOBILE.—As has been foreshadowed in the REVIEW for some time, the final crash has come. The General Carriage Company, of New York, which is the parent automobile organization of this country, and which came into existence some years ago with threats that their advent would soon result in an ordinance prohibiting the use of horses in the cities, has gone the way of its many offshoots in other cities, and has had a receiver appointed to wind up its business. It is not necessary to comment on the state of its finances, when the court required only a $5000 bond of this adjuster, while millions were

the figures paid in by the stockholders. This, we believe, is the last of the companies organized for public transportation, and its demise is without any other direct cause than inefficiency of the machine—which includes the features of expense, unreliability, and a failure of the public to patronize them. As a fad among the American "nobility," and as an advertisement for enterprising merchants, etc., they are still being used; but as a formidable rival of the horse as a means of transportation for business or pleasure, the probability grows less as familiarity with them increases.

THEY do things handsomely in Philadelphia, and surely the hard-working veterinarian has something to live for in the Keystone State. Our esteemed contemporary, the *Journal of Comparative Medicine*, appreciating the generous support of the profession of the State, tendered its constituency a delightful banquet at the late annual meeting of the State Association. In turn, the members, as a slight token of the esteem in which the editor of that journal is held by them, presented him with a handsome and costly dinner set of silver, and Dr. Pearson, as spokesman for his fellow-members, said all sorts of nice things about the recipient. The best of it is that Brother Hoskins deserves it all.

WE very much regret to note a backward step in the Connecticut Agricultural College, whereby it appears that the special purpose which brought the college into existence in 1881 through the philanthropy of Augustus Storrs—the advancement of the science of agriculture—is to be relegated to make room for pet theories of its President. In consequence four professors have resigned, among them that earnest and capable veterinarian, Nelson S. Mayo, M. S., D. V. M., professor of anatomy, physiology and veterinary science.

THE REVIEW will print another series of papers read at the Tuberculosis Congress in the October number.

ORIGINAL ARTICLES.

ELECTROCUTION IN HORSES.

EXTRACTED FROM THE REPORT OF L. ROSSIGNOL,* BY PROF. A. LIAUTARD.

These experiments were divided into two series and carried out at one of the plants of electricity in the suburbs of Paris, before a large body of veterinarians.

The director of the plant had arranged a system of short cast-iron poles united two by two by wires going to the powerful current furnished by the dynamos of the plant. These poles were encased at equal distances into wood beams about 1 metre 20 apart. The wires were connected with a commutator and a voltmeter, allowing perfect measurement of the distributed current. The poles of one wood beam represented the negative, those of the other the positive electric pole.

FIRST EXPERIMENT.

Two horses had been provided to be experimented upon. The first was an aged roan gelding, which had chronic laminitis and carried leather soles on his front feet. He was placed in such a manner that one hind foot rested well on one of the poles. 550 volts were made to pass through the arranged receivers. But the horse received only a weak shock, jumped forwards and ran away from the action of the current.

Two new attempts made in the same conditions were followed by the same result; at the third, however, a spark of electricity was seen at the iron pole where the contact had taken place. The animal suddenly flexed his fore legs, turned two or three times over and then resumed its standing position. For a few minutes he was much excited, had violent muscular tremblings, strong beatings of the heart, 51 pulsations to a minute. Then quite rapidly everything passed off.

*(*Presse Vétérinaire*, March and April, 1901.)

A fourth discharge was also negative.

At the fifth the current was raised to 600 volts; the horse flexed his fore parts, made a jump and stopped after walking a few steps as if nothing had taken place.

A sixth trial with 700 volts gave no result.

The second horse was then brought forward for experiment: it was a little stallion, in fair condition.

One of the fore feet was placed on the cast-iron pole and 550 volts sent through the current. The animal received a powerful shock, flexed down on his fore quarters, but his foot having left the electrified pole, he rose immediately. Examined a few moments after, he presented nothing abnormal; his pulsations were slow, 42 to the minute, his heart beat quietly. His nervous system did not seem excited.

With all those failures, the first arrangement of the cast-iron poles was modified and each pair of poles was covered with a piece of sheet iron to widen the surface of contact, and the animals were placed in such a manner that both fore feet were resting on one piece and the hind feet on the other.

The little stallion being in place, a continuous current of 550 volts was sent; all of a sudden, the horse fell on his side, remaining a few seconds on the plates of sheet iron, sparks jumping quite numerously. The shock was considered as fatal. The horse, however, succeeded in rising, made several wild jumps, then stopped and recovered quite rapidly. Yet the mucous membranes remained pale, the beatings of the heart, at first bounding, soon became quiet—the pulse was 80 a minute.

Then the feet (front and hind), the belly and the inside of the thighs were washed and kept moist. The animal was then placed in the same position, the fore feet on one plate, the hind feet on the other and a 550 volts current established. This time the shock was frightful, the animal fell down in a mass, the four legs apart, all the muscles contracted, he remaining in sternal decubitus, resting on the abdomen, sternum and inferior extremity of the head. The muscular contractions became more and more powerful; the neck was stiff, the teeth were

gnawing in the ground, and at last after a few minutes he fell on the right side, the arm and point of the shoulder resting upon one of the plates of the sheet iron. Death occurred rapidly after a bulbar life of a few minutes. Respiration, which had completely stopped at the moment of the electric shock, seemed to return. A few deep inspirations occurred which gradually disappeared.

At that moment it was noticed that the plates of sheet iron, which were still receiving electricity, were burning the wooden beams over which they had been thrown.

On examining the cadaver it was found that the conjunctivæ were a little injected, pale yellow in color, while the buccal mucous membrane was pale and entirely bloodless; the tongue, which was slightly blackish, was hanging from the right commissure; there were marks of burning at the point of the right shoulder, near the arm, over the place of the surcingle, and towards the abdomen; the hairs were singed, easily pulled away and exposed a slightly congested dermis under them.

The experiment was then tried again on the first horse. Same position and same electric current. Here again the shock seemed deadly, the horse fell with his legs apart, remained on his sternum and abdomen for a few moments, then dropped on his right side and struggled violently; his legs struck several times the plates of iron; at one moment sparks were noticed; the horse received another violent shock and suddenly got up, walked a few steps as if nothing had happened and stopped. He was much excited, had convulsive tremblings of the muscles, violent beatings of the heart; but all of which subsided shortly.

He was then placed over the plates for another shock. As soon as the same current passed, he fell down on his knees and on his hocks, remained in that position a few seconds, his legs stiff, but yet less tetanic than at the first time; finally he dropped on the right side, struggled violently with his feet, displacing the sheets of iron which came in contact, a short current took

place, a spark jumped towards the commutator, the current was stopped, but too late for the poor horse to be brought back to life. Respiration, which at first had stopped, returned deep, abdominal, at intervals more and more apart, the mucous membranes became pale, the pulse passed away; he was dead.

The two cadavers were removed to Alfort to have the autopsies made as minutely as possible. When they arrived at the school the cadavers presented a rigidity rather remarkable for its rapid appearance; the external mucous membranes were slightly cyanotic.

The first horse showed marks of beginning of burnings, but without subcutaneous ecchymosis. The peritoneal cavity and the peritoneum were normal; nothing peculiar in the stomach; the small intestines showed remarkable lesions; most of its circumvolutions were sound, yellowish in coloration, with numerous folds of the mucous membrane, but in many, on the contrary, the coats of the organ were soft, thin, without folds, and with a rosy coloration due to the dilatation of the capillaries. The paralysis seemed to have involved not only the blood vessels, but also the unstriated muscles of the coats of the organ. The large colon, the cæcum, the floating colon, the mesenteric glands were normal, as well as the liver. Pancreas, superenal capsules; the spleen only was perhaps a little bigger than usual.

The left kidney was gorged with blood, while the right was normal—probably this was due to the position the horse laid in when transported to Alfort.

In the thoracic cavity the costal pleura was normal; the visceral was reddened by alteration of the blood. Nothing peculiar in the pulmonary parenchyma.

The heart had stopped in diastole, and was gorged with blood. There were few petechiæ under the pericardium.

The blood was asphyxic; bluish, dark, viscous, coagulates no more, does not redden to the air. That explains the red tint of almost all the parenchymas.

Towards the nervous system, there was nothing to notice, notwithstanding a most careful dissection of the marrow and of

the brain. The medullary and cerebral substances were absolutely normal, the cephalo-rachidian fluid had its normal coloration; the choroid plexuses were red, as they are in all horses which have not been bled.

The second horse presented nothing on the peritoneum, liver, spleen and superenal capsules. On the superior face of the right kidney there exists a wide ecchymosis, but its parenchyma was healthy; also the left kidney.

The stomach was normal. The small intestines presented, like the first, lesions quite extensive; circumvolutions, 50 centimeters in length, were found between sound parts of the organ; they had their walls thinned out, rosy in color, with soft unfolded mucous membranes. All the other organs were healthy.

In the thorax the parietal pleura was healthy, the visceral presented a few ecchymoses; there were some also on the external face of the pericardium, while the visceral showed some petechiæ. Very slight lesions existed on the endocardium; on the mitral valve were ecchymoses.

The blood had all the characters of asphyxic blood. In the nervous system nothing, nor on the meninges, the medullary or encephalic structures; the choroid plexuses were slightly congested.

Altogether, very limited lesions, truly visible only on the small intestines and the blood.

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SECOND EXPERIMENT.

In this experiment it was decided by the Committee to (1) kill one horse with a current of 550 to 600 volts, and make the post-mortem 36 or 48 hours after, and (2) expose another to a current more and more severe until life was in danger, and then keep him for several weeks.

Somewhat similar preparations to those used in the first experiment being made, the first animal, an aged bay mare, was first exposed to a current of 100 volts. She flexed the knees suddenly when the shock struck her, made a jump sideways and walked off. With 200 volts she again trembled on her knees,

stretched up and walked away. At that moment the pulse was thready, the beating of the heart accelerated, the respiration quite fast, 34 to a minute.

At 300 volts the same fall and quick getting up occurred.

At 400 the shock was more severe; the mare dropped on her fore quarters, on her knees, then on the left side, and again got up with one jump. The respiration was very accelerated (42 a minute), pulse almost imperceptible, and the beatings of the heart very tumultuous.

After waiting some time for the mare to recover she was again placed on the plates and received a shock of 550 volts. Suddenly she flexed on her four legs, dropping on her knees and her hocks extended; after a few seconds she got up. The respiration was then very fast (46 a minute); it was deep and abdominal; the pulse was imperceptible, the beatings of the heart very irregular; the temperature was 40°3.

The animal was allowed a lapse of rest, and the second animal brought to the plates.

It was a bay mare, which was first exposed to a current of 550 volts. The shock was rather severe; the animal pitched forward, but recuperated her equilibrium quickly.

A second shock was much more violent, so much so that it was thought it would be fatal; the animal dropped suddenly on her knees, rolled on her right side, struggled violently, trying to get rid of the contact of the plates, but in vain. Suddenly the respiration stopped, the extremities became stiff, the muscles appeared tetanic; but soon the respiration returned quick and accelerated, the legs struggled again, and the contact from the plates being broken up, the mare after a few efforts got up.

The pulse was then quick (68), full, beating of the heart very strong, respiration accelerated. For some time muscular tremblings of the trunk and legs were manifested, and then everything went back to normal condition. There were marks of burns on the right fore fetlock.

The very severe electrization saved the life of the animal

or the present. It was decided to keep her up. She was sent to the ward of physiology for observation.

The first subject was then taken up again. Her abdomen and legs were wet with water, and after being placed on the plates she was exposed to a current of 550 volts. She fell suddenly, pitching head forward, but her feet having left the plate she was able to get up at once. Two other attempts had the same result.

At the fourth trial, she received 650 volts. Again this time the fall was very sudden, and took place in such a manner that the animal escaped a long contact with the plates, and was able to get up by one jump.

At a fifth trial, the animal was placed somewhat differently, the hind feet resting on the plates. With a current of 550 volts, the hocks flexed, the animal dropped on the left side, with the croup on the positive plate and the chest on the negative. The struggles became very rapid and violent, the muscles became tetanic, a general spasm took place, the legs were stiff and stretched, respiration stopped for a few moments, then returned rapid and costal. A strong odor of burning was followed by the apparition of smoke. There was micturation, the labial mucous membrane and the conjunctivæ became pale, the pituitary still remaining rosy. Death seemed near at hand and the current was stopped. The mare still showed her vitality. She seemed to be able to overcome the terrible trial she had just passed through. The pulse became stronger, very rapid (120), respiration quieter (80), but the hind quarters remained paralyzed. Vainly did she struggle to get up. After a few moments she was dragged over the positive plate again, and the current reëstablished; death occurred rapidly. Her cadaver was taken to Alfort and the post-mortem made 48 hours after.

The cadaver was very tympanitic. Serosity was escaping from the nostrils, mouth and anus. The visible mucous membranes were pale. There were marks of burns on the left side, at the elbow and stifle.

On opening the animal, there was a violent odor of putre-

faction; the change being very rapid and many of the lesions found must be attributed to it.

The blood was black, partly coagulated, the clots being brown, soft and diffluent. The serum was colored by the hæmoglobin. The various serosities were also colored red by it. The muscles were pale, discolored. In the abdomen only lesions of putrefaction were observed.

The intestinal mucous membrane was greyish and without folds. All the organs presented lesions of putrefactive conditions.

In the chest, the lungs, the bronchial lymphatic glands, the myocardium and the endocardium present also indications of putrefying structures.

The nervous system is softened. In other words, all the lesions found in the first post-mortems are no longer visible; hence, the indications of making the post-mortems as early as possible.

The other animal of that experiment which went to the ward of physiology at Alfort, recovered entirely, and was destroyed several weeks after for dissecting classes.

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CONCLUSIONS.

By these experiments, it is demonstrated that the lesions produced by electricity are very mild, almost insignificant. Death taking place by asphyxia, alterations of the blood and mild bloody effusions under the serous membranes and few intestinal lesions are all which may be found. All the other organs, and especially the nervous system, remain sound.

But this absence of lesions cannot embarrass the expert called to decide as to the cause of death. On the contrary, the *absence* of *all* specific lesions is a proof which will be corroborated by the reports of those who may have witnessed the accident of electrocution.

They have also proved that to kill a horse with electric current, the sudden shock of even 650 volts is not sufficient; what is necessary is that the fall of the horse must take place over

the electric pole of the track in such a manner that the continuity of the electric current through the body of the animal exists; and, again, if, as it has been proved, horses placed in different conditions have been killed suddenly by the traumatism of the shock only, the death can only be attributed to a special physiological condition due to excess of work (very accelerated respiration and circulation, abundant perspiration, etc., etc.).

Finally, when such accidents occur in the street, if the animal can be dragged off from the contact with the electric pole, there is great chances that his life can be saved, as the sequelæ of even a very severe electrization are generally harmless. Of course, the dragging of the animal must be done with care to avoid danger.

BOVINE TUBERCULOSIS.

PERIOD OF INCUBATION—AGE OF LESIONS—EXPERIMENTAL RESEARCHES.

By MM. Nocard and Rossignol.

Translated for the Review by J. F. Winchester, D. V. S., Lawrence, Mass.

(*Concluded from page 326.*)

FOURTH LOT, COW 9—INTRAVEINAL INOCULATION.

The evening of the inoculation at 7 o'clock this cow was affected, short breathing, dejection, loss of appetite and elevation of temperature. Until May 22 hyperthermy had been intermittent, but from that date the temperature remained high with slight variation.

The infection was very marked the 14th day, when she manifested very plain symptoms. The head is turned on the neck, the physiognomy anxious, the nostrils are dilated, the respiration is short, 60 a minute; the respiratory sounds remain, a capricious appetite, a frequent short failing cough. The following days the same symptoms became more pronounced, the prostration is very great and the animal is almost constantly lying down.

May 30 the animal No. 9 fell in a veritable marasmus and physiological helplessness; she has lost considerable flesh, her

abdomen is tucked up; respirations 70 and pulsation 100 per minute, trembling of muscles of the thighs and shoulders, the respirations now are plaintive and interrupted.

She has not eaten since June 3, and June 6 during the night she died.

Autopsy.

All the viscera, lung, liver, spleen, kidney, udder, lymphatics, bony marrow, are infiltrated with an incredible quantity of extremely fine nodules, which when cut through give to the finger a gritty sensation. It is a typical case of acute miliary tuberculosis. The histological examination of the pulmonary tissue shows it to be formed almost exclusively of embryonic nodules, being hardly one half millimeter in diameter; so numerous are they and so close together that the permeable tissue between them is hardly equal to the space which they themselves occupy. The central cells of the nodules are in process of caseification. They are infiltrated with Koch's bacilli, less numerous than one would expect.

FIFTH LOT, COWS 10 AND 11—INTRA-MAMMARY INJECTION OF TUBERCULAR EMULSION.

The 10th of May, the second day after the injection, the teats of cow No. 10 are tumefied, hot, sensitive to touch, the milking becomes difficult and painful and gives a clotty curdled milk, and in the evening a slight hyperthermy, 39°.1; the other teats are normal.

May 11, 12, 13, and 14 the mammæ increase in volume and sensitiveness; the corresponding teats are hard and turgescent. It is with difficulty that a few drops of curdled milk are drawn from the diseased teats. The temperature remains between 40° and 40°.5 until the 14th, when the animals were subjected to the first tuberculin test, but it was without effect, the temperature not increasing during the 15th of May. On that day, however, this cow is dejected, has an arched back, and is at the end of her chain when standing; but she prefers to lie down, eats but very little, and her teats have increased in volume.

Until May 20 her condition is stationary, her appetite always

capricious, has improved some. She was tested this day, using 3 cc. of tuberculin, but it is not followed by a reaction.

The evening of May 22 the temperature is 39°.8, respirations 36 a minute, and the milk in the diseased quarters is not only curdled, but purulent. There is no appreciable change to May 26 other than loss of flesh, and that day she was again submitted to the tuberculin test, but no reaction is shown. Contrarily, the next day, 27th, the temperature goes down; 5.30 A. M., 38°.5; 8.30, 38°.5; 11.30, 38°.9; at 2.30 P. M., 38°.7. The temperature the 28th had gone up and remained steady until slaughtered.

On the 29th there was an œdema in front of the udder, which increased very fast. In the meantime the respirations had increased to 42 to the minute, and a cough is heard now and then.

This cow was again subjected to the tuberculin test June 1st, when she had hyperthermy, and she maintained her high temperature the 2d. On that day her general condition has become still more serious, wasted, staggering walk, accelerated respiration, 30 a minute, veinal pulse very plain on the jugular, 100 per minute, the œdema extending to the sternum.

The symptoms kept increasing in severity until the 6th and death seemed to be near.

The œdema has decreased on the 8th, mastitis is found only in the infected quarters.

On the 9th this animal was sent to Alfort, but had fallen on the way, and it being impossible to get her up she was bled and autopsied the 10th.

Autopsy.

The mammary region forms an enormous mass weighing 5250 kilo. It consists almost entirely of the two inoculated glands. The two normal glands (right anterior and left posterior) are normal in appearance, their tissue is white, supple, soft and unctuous to the touch; the milk contained in the galactophorous sinuses has a very good appearance; it does not contain any Koch's bacilli; they (the sound glands) together weigh

0.770 kilo. Considerable œdema extends around the diseased mammæ and spreads under the abdomen beyond the umbilicus. The two inoculated glands are invaded throughout by the tubercular infiltration. When cut they present a rosy color somewhat yellowish ; their lobes are coarser, due to the increase of connective tissues, giving to the touch the sensation of a rasp. The galactophorous sinuses are distended by a yellow serosity containing fibrino-purulent clots. The mucous membrane is thickened, infiltrated, hyperæmic, pimply and ulcerated in places. Here and there on the red substratum of mucous membrane are seen yellowish points due to the presence of specific miliary nodules.

The mammary lymphatics are five times their normal size, being distended with serosity ; their cortical layer is filled with tuberculous granulations already casefied. The precrural lymphatics present the same lesions though less pronounced. The sub-lumbar ganglions are also affected, but the changes diminish in intensity from the rear to the front. The most posterior are almost the size of a kidney, while near the mesenteric artery they have hardly increased in volume, beyond that they are normal.

It is plainly seen that, from the mamma the infection has spread slowly toward the centre through the lymphatics. Death was caused by tubercular intoxication, before the infection had reached the viscera. In fact, the visceræ of the thorax and abdomen are absolutely free from all tubercular lesions.

The bacteriological examination of the mammary tissue shows an enormous numher of Koch's bacilli, mostly free.

Until May 21, that is thirteen days after the virulent inoculation, Cow No. 11 has maintained a normal temperature. It went to 39.5 and 39.8 as a result of an injection of tuberculin May 20. The first symptoms of mammitis is shown around the left anterior and right posterior teats ; the quarters became hypertrophied, hot, sensitive, and the milk is clotted and curdled.

There is hyperthermy and hypothermy until May 25. On the 26th, the day of testing, the temperature is 40°. The next

day, the 27th, hyperthermy well marked. The infected glands are very large and the posterior one is very prominent; they are hot and extremely sensitive, and the curdled milk is mixed with muco-pus. The 29th of May her condition is very serious and there is some coughing. On May 31 there is very little milk in the infected quarters, and œdema appears under the belly in front of the udder.

June 1, extreme emaciation with very great prostration.

June 2, hurried respiration, 28 a minute, frequent cough, veinal pulse, 70 a minute, frequent eructations; the infected quarters have become very large, hot and extremely sensitive to touch; appetite about gone.

June 3, 4, 5 and 6, the symptoms increase in intensity, prostration very great, death is soon expected.

She is sent to Alfort the 9th and post-mortem made the 10th.

Autopsy.

The udder is an enormous mass weighing 6 kil. 50; the weight of the normal quarters is only 0.950.

The diseased glands present exactly the same condition as was seen in Cow No. 10.

The mammary lymphatics are equally hypertrophied and they are infiltrated in their cortical layer with agglomerated miliary granulations.

The sub-lumbar lymphatics have increased in volume and are distended with a serosity, but they seem to be free from tubercular lesions.

All the viscera of the thorax and the abdomen and their lymphatics are sound.

SIXTH LOT, COW NO. 12—TRACHEAL INJECTION OF TUBERCULAR EMULSION.

This cow calved May 11th, and did not present anything abnormal until June 15th. Her temperature has remained normal, good spirits and appetite, the approach of calving and its consequences has not produced any hyperthermy with her.

The tuberculin inoculations practised on her May 14, 20, 26, and June 1 and 8 have not caused the slightest hyperthermy.

There was a temporary hyperthermy of 39°.5 June 15, due to the inoculation of tuberculin June 14. At 9 A. M. the 15th, the temperature had become normal aud it remained so until June 28, when it rose to 39°.3 at 6.30 A. M., but at 9 A. M. it was 37°.8.

The indications are that the commencement of the infection goes back to June 15, that is, the 38th day.

Autopsy.

Under the skin and on the internal wall of the trachea, where the needle of the syringe penetrated, there is found tumors, those under the skin larger than on the trachea. They have the appearance of pimples, infiltrated with yellowish and caseic clots. The mucous membrane of the trachea presents a patch of fine granulations. Some are half transpaient, others opaque and yellowish in the centre; nearly all are surrounded by a bright red halo. These granulations are disposed in linear series; more numerous above the point of inoculation and seen to stop short at the lower end of the larynx, the mucous membrane of which is normal. The mucous membrane of the large and small bronchii is sound. A thorough examination of the lung does not show any tubercular lesion to the eye or touch. The retro-pharyngeal glands are filled with a multitude of fine tubercular granulations, yellowish and caseic. The bronchial and œsophageal glands are involved, but the lesions are slight and apparently recent.

It is a remarkable fact to see the bronchi and the lungs healthy after having so much infecting material injected into the trachea.

Phagocytosis is so intense at the surface of the bronchial mucous membrane that the bacilli must have been eliminated with the expectorated mucus. The slight infection revealed by the autopsy, is manifestly caused by some traumatism by the inoculating needle. Without this traumatism it is probable that the cow would have escaped the infection.

SEVENTH LOT—SUCKLING CALF FED ON CONTAMINATED MILK.

This calf was born May 11, and has been exclusively fed

from a bucket. It drank A. M. and P. M. its mother's milk constantly mixed with other milk, very rich in bacilli, which was supplied by cows No. 10 and No. 11. This young animal has always been in good spirits and a vigorous appetite.

Its temperature remained normal until June 26, when it was 39°.1. June 27, the day of the last tuberculin test, it was 39°.3; then the next day, the 28th, there was a thermic and organic reaction, with the following temperatures: 6 A. M., 40°.3; 9 A. M., 40°.5; 12 M., 40°.8; 3 P. M., 40°.8; 6 P. M., 40°.6. June 29, in the morning it was 39°.8, evening 39°.6. July 1st it had gone down to normal, 38°.7.

The organic reaction was manifested by dejection, great prostration, complete inappetency, general trembling, continuous moans and an intense lameness of the left fore leg, back of which shoulder the injection of tuberculin (2 cc.) had been practiced. June 29th all traces of organic reaction had disappeared.

From the 26th of May this calf was submitted, together with all the other animals, to the tuberculin test, and the quantity used was 2 cc. It did not cause a reaction until June 27. The last contaminated meal was taken June 9. The minimum duration of the incubation was 18 days.

It is important to notice that this calf showed some hyperthermy on June 26, 39°, 39°.1, and on June 27, 43°.3, *before* it received the injection of tuberculin.

Autopsy.

The mouth, the velum of the palate, the pharynx, the larynx, and the trachea are sound, so are the sub-glossal glands; only one retropharyngeal gland on the right side shows in its anterior lobe a small yellowish focus of a tubercular nature.

The pulmonary visceræ are sound. All the ganglions of the concave side of the intestines seem to be hypertrophied. The first ganglion of the chain show quite recent tubercular infiltration. Toward the middle of the small intestine there is found another, which is filled with very fine miliary granulations half transparent. A Peyers gland is thickened, hardened, but not

ulcerated. Nowhere on the intestinal mucous membrane are to be found any tubercles or ulcerations.

CONCLUSIONS.

From these experiments we infer, 1st. That ingestion constitutes a mode of contamination much less efficacious than inhalation.

One cow resisted infection although she ingested large quantities of tuberculous material.

Three others were infected, but in one of them it was impossible to locate the lesion, which had been determined by the use of tuberculin, while in the remaining two the tubercular lesions were so small that in a less critical autopsy they would certainly have been overlooked.

The calf itself, which since its birth was fed on milk from cows 10 and 11, a milk extremely rich in Koch's bacilli, was infected only to a slight degree.

The period of incubation has varied from 32 to 48 days.

2d. The respiratory organs constitute the most common and most efficacious means of tubercular infection.

The results are about the same when the tuberculous material is inhaled in a state of dry impalpable dust, or in a state of fine liquid particles containing bacilli, as is the case when a tuberculous animal coughs or snorts in the vicinity of sound animals.

The period of incubation has varied from 19 to 32 days.

The direct injection into the trachea did not give the results that some had expected.

The lungs completely escaped the infection. It was because the liquid injections did not reach the pulmonary cells; they did not get beyond the small bronchi, on account of the phagocytal resistance of the bronchial mucosa.

The bacilli injected were absorbed by the phagocytes and thrown out in the mucus of expectoration. In the animals infected through the inhalation of dry or liquid dusts, the bronchi, the small bronchi and the pulmonary alveoli have escaped the infection; the tuberculous nodules had their seat under the

pleura, or on the periphery of the lobules in the interstitial cellular tissue.

It is likely that each tubercular focus was formed around a phagocyte of the bronchial mucosa absorbed into the lymphatic circulation after having absorbed one or several Koch's bacilli.

3d. The mucous membrane of the mamma is very susceptible to microbic infection and offers a very slight resistance to Koch's bacilli, especially during lactation.

These experiments and similar ones practiced on milking goats have demonstrated that of all the tissues of the living organism, the mamma in a state of lactation makes a field best adapted to the growth of the tubercular bacillus. They show, also, but this is denied by some authors, the possibility of primitive tuberculosis in the mammary gland.

They show finally how real is the tubercular intoxication.

Cows 10 and 11, killed just before going to die, did not show any such organic lesion as could explain that deep cachexia which was causing death. With them the period of incubation was very short; 3 days for cow No. 10; 13 days for cow No. 11.

4th. The intravenal injection asserted itself, as it always does when a virulent bacillus is used, as the most severe and rapid method of infection, but no practical conclusion can be drawn from it, as tubercular infection never develops in that manner.

5th. This observation is the last, and has a very practical import.

On none of the animals experimented upon, no matter how short the period of incubation, or how rapid the evolution, the lesions had not undergone the mollification or the calcification, which is the rule, one may say, with all the tubercular bovines.

To sum up our conclusions in reference to the *two* points aimed at by our society:

1st. Whatever may be the means of contamination, there always elapses some time between the moment when the contagion has penetrated the organism and that where it manifests

its effect through tuberculin reaction. The duration of this period is variable; in our experiments, where the chances of infection were brought to a maximum, the period was from 19 to 32 days for contamination by inhalation, and from 32 to 48 days for contamination by ingestion. With the condition of natural contagion it is certain that the period of incubation will be considerably longer.

If a recently purchased cow shows a reaction to tuberculin within 30 days following the sale, the veterinarian is justified in concluding, that, according to *all probabilities*, this cow was infected before the sale.

2d. One is often embarrassed in ascertaining the age of the tubercular lesions found at the autopsy; our experiments do not offer a complete solution of this problem; however, should the lesions be mollified or calcified, no matter what their extent is, so slight and so limited as they may be, the veterinarian will be hereafter enabled to state, in all certainty, that those lesions have been in existence for more than fifty (50) days.

PLANTS POISONOUS TO STOCK.*

The year-book of the Department of Agriculture for 1900 contains an interesting account by Mr. V. K. Chesnut, of the Division of Botany, on some of the losses sustained by stock-raisers on our Western and Northwestern stock ranges by stock eating certain poisonous plants indigenous to those regions. A synopsis of Mr. Chesnut's account is here reproduced for the benefit of the readers of the REVIEW.

The principal causes assigned by Mr. Chesnut for plant-poisoning of stock is the scarcity of food which at times prevails over large areas of our Western ranges. Stock that in times of a plentiful supply of forage would not partake of the poisonous plants are, in periods of scarcity, compelled by hunger to eat them. It is a fact well known to every toxicologist that plants which are most poisonous usually present the most succu-

* Prepared for the REVIEW by Dr. W. J. Martin, Kankakee, Ill.

lent and inviting appearance to the unwary. Adult horses and cattle, according to Mr. Chesnut, do not so commonly fall victims to poisonous plants as do the smaller and weaker herbivora, these latter being more circumscribed in their pasture-range than the older and stronger animals. Sheep, it appears from the report, are more often poisoned by noxious plants than any other animal. The plants treated of most fully in the report as being poisonous to stock are the water hemlock, various species of larkspur, and the poison camas. Mr. Chesnut's description of these is as follows:

WATER HEMLOCKS.

General Characters.—The local species of water hemlock are the plants best known throughout the whole of the Northern stock regions as poisonous to stock. These are members of the genus Cicuta, belonging to the carrot family. There are at least three distinct species of this genus in the Northwest, the fleshy roots of which, under the erroneous name of "wild parsnip," are rapidly fatal to man or beast if eaten even in small quantity. All are alike in being smooth, generally erect, perennial herbs, 3 to 8 feet high, with one or more upright hollow stems, numerous branches, mostly bipinnate leaves with lance-like and serrated leaflets 1½ to 4 inches long, and terminal umbels of small white or greenish-white flowers. The seeds, and especially the fleshy roots, together with the geographic distribution of the plants, serve to distinguish the species.

Species and their Distribution.—The most widely known members of the group in the United States, the American water hemlock (*Cicuta maculata*), is probably the most deadly plant native to this country. An account of its poisonous character may be found in the year-book of the Department for 1896. A very similar species (*C. virosa*), which is equally poisonous, is well known throughout Europe. Both of the latter species, although fatal if eaten by animals, are best known as being dangerous to man. Children especially are killed by eating the fleshy rootstocks in the early spring, when they are most apt to be exposed by being washed or frozen out of the soil. The

American water hemlock is abundant in the more humid eastern part of the United States, but apparently it does not extend very far into the drier portions of it which are considered in this paper.

Several Western species are best known as stock-poisoning plants. In Wyoming, and probably throughout all the adjoining States, the Eastern plant is very largely, if not entirely, replaced by the Wyoming water hemlock (*C. occidentalis*), a not very different plant. The purple stemmed water hemlock (*C. douglasii*), as well as the Oregon species (*C. vagans*), is native in springy and boggy places and along streams on the humid Western coast. It is not so widely distributed as *C. vagans*, but is well known as a poisonous plant in Washington and in British Columbia. The Oregon water hemlock is widely distributed from Northern California and Nevada to Washington and Idaho, but is most abundant in Oregon. The purple-stemmed species differs from the Wyoming plant in having a purple instead of a green stem, smaller and more numerous roots, and various minor characters, which are of interest from a scientific point of view only. The Eastern species has short, spindle-shaped or oblong tuber-like roots, which are about an inch or two in length. All grow in damp ground, either along creeks and ditches, or in low marshy places, especially along the banks of coast rivers, almost down to the salt water, and frequently in meadows which are cut for hay.

Odor.—Like most of the members of the carrot family, to which the water hemlock belong, they have a peculiar penetrating odor and taste, due to the aromatic oily fluid which is found throughout the plants, especially in the roots and seeds. It is probably on account of this odor that the plants are usually compared with the parsnip, which is the only commonly known fleshy-rooted member of the carrot family possessing a similar odor. In the case of the water hemlocks, however, the odor is more decidedly musky and much more disagreeable. The parsnip has one large fleshy taproot, and never becomes poisonous when growing without cultivation. The water hemlocks have a clus-

ter of fleshy roots which are highly poisonous, the oily fluid in them containing a highly virulent substance, which is probably the same in all the species.

Roots.—The roots are said to have a benumbing effect upon the tongue after long chewing. Unfortunately, however, the first taste is somewhat sweet and not sufficiently disagreeable to deter children and even men who are in search of wild aromatic roots from quickly eating a sufficient quantity to produce fatal results. They are generally eaten by mistake for other wild-growing roots of the carrot family which have a somewhat similar taste. Cases of human poisoning have been recorded against all of the species of the Northwest with the exception of the purple-stemmed one. In the spring of 1900 as many as four people were killed in Montana by eating the roots of the Wyoming species. The poisonous properties are well known to the Indians, who occasionally use them for suicidal purposes.

In the case of each of these plants the root is the part best known to be poisonous to stock, but the tops are also poisonous under some conditions. After long continued rain the roots are so loosened that they can be pulled out of the ground without difficulty by stock while grazing. In some places the oil has been swallowed with water found in marshy places where the roots have been trampled upon. Horses that are used in plowing virgin soil in wet land are not infrequently killed by eating the exposed roots. Poisoning from the roots takes place during winter and early spring, and observations seem to indicate that the roots are poisonous only at that time of year. A piece of the Oregon root about the size of a walnut is, according to Prof. Hedrick, sufficient to kill a cow. Animals may be killed in the pasture by eating the young leaves or stalks of plants less than a foot or two high. The basal portions of such plants are, at least in the case of the Wyoming species, much more poisonous than the tops.

Leaves, Seeds, and Stem.—The green leaves from the taller plants are not nearly so dangerous as the lower portions. Seeds on plants cut with wild meadow hay, and perhaps to a lesser

extent the leaves and stems of such plants, have caused a very considerable loss of stock in the Dakotas and Montana. Such hay is very much more apt to be fatal if fed in boxes, for the seeds, which are easily detachable, are not then lost when the plants are tossed about by the animals in eating, but accumulate in the bottom of the box, and are, therefore, more apt to be eaten.

Damage Caused.—No systematic attempt has ever been made to obtain statistics showing the extent of the damage caused by the water hemlock in the Northwest. That it is considerable may be judged from the fact that so much attention has been paid to the plants by various experiment stations. One man on the Sprague River, in Oregon, has recently spent much time and money in an attempt to eradicate the plants from his range, and Prof. Hedrick has stated that an estimated death rate of one hundred cattle per annum was low for that State. During an investigation of the poisonous plants of Montana in the months of May and June, 1900, Dr. E. V. Wilcox and the writer noted thirty-six cases of water hemlock poisoning among cattle, thirty of which were fatal, and one hundred and five cases among sheep, fifty of which were fatal. It will thus be seen that the death rate was very high. The above deaths represent a loss of over $4000, but this is only a fraction of the entire loss in Oregon and Montana for that year.

Symptoms of Poisoning.—The symptoms of poisoning resulting from the accidental eating of any of the poisonous parts of any of the water hemlocks agree well with each other, and also with those obtained in experimental ways. The effects of the Oregon plant has been noted by Prof. H. T. French and U. P. Hedrick in the case of a yearling calf that ate two of the roots one morning at about 9.15 o'clock. At 10.25 o'clock the muscles of the flanks began to twitch, the eyes watered, and the animal became excitable. Its temperature had risen to 104 deg. F. There was also a marked increase in the amount of urine voided, a symptom which was prominent until death. The first spasm took place at 10.45. There was then a marked

activity of the sweat glands and the rate of breathing was doubled. At 11.30 the calf had another spasm, and this was followed by others in rapid succession until death ensued at 11.45. Other observers have noted other symptoms, the most prominent of which are an increased flow of saliva, bloating, severe pain in the stomach, and widely dilated pupils. Death takes place within a few, sometimes within one and a half hours after the plant has been eaten.

Effect of the Poison as Shown by Post-mortem.—Post-mortem examination nearly always reveals the characteristic musky odor and often pieces of the plant, especially the root, in the stomach. These furnish the most conclusive evidence of the nature of the poison, for there seems to be no very characteristic lesions. The lungs and brain are often highly congested, and one authority, Prof. L. H. Pammel, cites a correspondent who states that in the case of a cow killed by eating some roots the mucous membrane of the stomach was black and as easily scraped off with a stick as if it had been scalded.

Nature of the Poison.—The American water hemlocks have not been carefully analyzed, but probably all of them contain the peculiar compound known as cicutoxin, which was first isolated by R. Boehm from the European plant. Two-tenths of 1 per cent. of the pure substance was obtained from the fresh root and 1 and a half per cent. from the roots which had been dried. As described by Boehm, it is an uncrystallizable, resinous body with an acid reaction and a disagreeable bitter taste. It is very soluble in boiling water, and in dilute alcohol. This substance is not an alkaloid nor a member of any extensive class of poisons, but belongs to a small group of very poisonous compounds known as toxins. Andremedotoxin is a similar substance, which is found in many well-known plants belonging to the heath family (*Ericacea*), some of the members of which, such as sheep laurel (*Kalmia angustifolia*) and the calf kill (*Leucothœ catesbœi*), are well known along the Atlantic coast as poisonous to young stock. The fatal dose of cicutoxin for cats is 50 millegrams for each kilogram of

body weight when administered through the mouth, and 7 millegrams per kilogram when injected hypodermically. 100 millegrams (about 1.4 grains) will kill a cat weighing about 2 kilograms (4.4 pounds) if fed to it. The prominent symptoms are very similar to those produced when the plant itself has been eaten, and consists of salivation and constant trembling of the limbs, with cramps and convulsions, finally ending in death.

Remedies Sometimes Used.—Cases of poisoning of stock by the water hemlocks are very difficult to handle, both because the animals generally become wild and unmanageable, and because the action of the poison is so rapid that the animal is usually dead when found. Tannin is mentioned by Fröhner as a chemical antidote, but it must be used together with chloral or with hypodermic injections of morphine to offset the physiological action of the poison already absorbed into the system. Animals generally die after eating fatal doses, but they are able in some instances to vomit the excess and recover. Stockmen occasionally save their animals by administering two or three daily doses of melted lard.

POISON CAMAS.

Species and Distribution.—The species of poison camas (*Zygadenus* species) are but few in number and in great part confined to the northwestern and western parts of North America. One species occurs in Siberia and another in Mexico. Their published reputation as poisonous plants is, however, mainly confined to America and to the last century. They are all poisonous and sometimes fatal to both man and beast. They are all smooth, single stemmed, onion-like, but unscented plants, one-half to 3 feet high, with coated bulbs, long, grasslike leaves, and single cylindrical clusters of yellow, white, or greenish flowers, which finally develop into dry, three-horned seed capsules. The plants have much the appearance of grass in the early stages of their growth.

Some botanists recognize at least six different species as native to the Northwest, but as only three of these have been extensively mentioned in any way, attention will be confined

to them. The plant widely known throughout nearly the whole Pacific slope area as death camas (*Z. venenosus*) is very similar to two other species found in the Northwest, and to another, commonly known as wild sego (*Z. paniculatus*), which occurs in the great interior basin. As the two former have long been considered identical with death camas, and as they are all alike in the symptoms of poisoning which they produce, may well serve to illustrate all of them. Death camas differs from poison sego in its slender, instead of stout habit, its unbranched inflorescence, and its long-clawed and obtuse pointed petals, those of poison sego being acute pointed and almost clawless.

Habitat and Characteristics.—Death camas grows sparingly along creeks near the coast, and abundantly in the interior up to an altitude of nearly 9000 feet, its favorite habitat being shallow depressions in mountain pastures into which there is a slow seepage of ground water. Poison sego grows in low, damp, alkaline depressions throughout nearly the same area, but it is most abundant in the Great Salt Lake Basin, where it ascends to an altitude of about 4500 feet. The third species of poison camas (*Z. elegans*) is a much taller plant than either of the others. It is best known in the stock regions as alkali grass. It is most easily distinguished by its taller habit and the larger size of its various parts, especially of its flowers. It is a slender plant, which grows in moist alkaline places from northern California to Colorado, and northward to Alaska. It is never so abundant as either of the two preceding species. The leaves, and especially the bulbs, of these three species produce a foam when rubbed up with water, and they are generally more or less bitter, especially after long chewing. This taste is not, however, always present.

Poisonous Character of the Plant.—The earlier reports naturally refer almost exclusively to human cases of poison. It has been but a few years since any of the plants have attracted much attention as being fatal to stock. It has been stated, as noted above, that the bulbs are not poisonous to hogs, but they are very commonly considered fatal to other stock. Prof. F. H.

Hillman has published two brief accounts illustrating the wild sego (*Zygadenus paniculatus*) and suggesting that this plant is probably responsible for the death of a considerable number of cattle in certain alkaline districts of that State. So far as the writer is aware, however, no toxicological experiments were made prior to 1900 with any of the species which proved their poisonous qualities. The experiments made by Dr. S. B. Nelson at Pullman, Wash., were wholly negative in result. A pound of the plant, in blossom and fruit, was fed to a sheep during the course of about twelve hours without causing any marked ill effect. In the spring of 1900, Dr. Wilcox and writer, independently of each other, made several tests on rabbits and sheep, both with extracts and fresh plants, and none of these failed to give some positive evidence of the physiological activity of the plants. In every case, even in the feeding experiments, however, the animals received nearly all the material given them within a few minutes, and, moreover, most of the plants used were not yet in flower. This may account for the difference of our results from those of Dr. Nelson, or it may possibly have been due to a difference in the species used. The latter can hardly be the case, however, for the same species has proved poisonous in a number of cases which occurred in Oregon and Washington under the usual conditions. The difference is mostly attributable, therefore, to the difference in the rate of feeding and to a possible stage of growth at which they were used. It may, however, be possible that the Washington animal was older than ours and had previously accustomed itself to the plant.

When Dangerous to Stock.—Stock are poisoned by eating the bulbs along with the leaves, or by the leaves alone while at pasture, or by the seeds when present in hay, as they sometimes are. As a rule, the bulbs cannot be pulled up by stock in the act of grazing, but after the ground has been thoroughly soaked with rain they may be, and sometimes are, so extracted. Stock, especially sheep, are usually killed by eating the plant before it has blossomed in the spring. The leaves appear early, and are then very tempting to stock on account of their succulent

condition and also on account of the lack of other herbage. After the plants have blossomed, which with the species growing on the feeding ranges occurs about the 1st of June, the leaves dry up, and as they are not very inviting in appearance are probably never eaten by stock. Whether or not all or any of the species are non-poisonous at that stage of growth is a matter which has not been determined. It is very doubtful if such is the case. There is a popular belief to this effect, but it appears to be certain that the seeds of at least one species—the great Basin plant—kill stock when eaten with hay. It is very doubtful if the plants are eaten on the range in a nearly mature stage of growth. The absence of heavy rains on the ranges in summer precludes the possibility of stock being poisoned by eating the bulbs during that period. There are some general grounds for belief that the bulb is the most poisonous part of death camas, but no experiments have been made to show that such is the case.

Reports of the poisoning of stock from one or another species of poison camas while grazing have been sent in to the Department of Agriculture from nearly all parts of the Northwest. The only cases of poisoning from hay have been reported from Nevada. These were due to the seeds of poison sego. Most cases were, however, caused by death camas, which is far the most widely known species.

Damage Caused.—Poisoning from this plant is so common in Oregon and Nevada that the term "lobeliaed" has been invented to indicate the resulting death or symptoms of poisoning. In Montana as many as 3030 one-year old and two-year old sheep were reported to have been poisoned by death camas during the spring of 1900. Two thousand of these were poisoned in a single band. Over 21 per cent. of the total number died. The money value of the total loss from poison camas in the Northwest has not been estimated, but must be considerable. The losses noted by Dr. Wilcox and writer in Montana during the spring of 1900 were due to but one species and amounted to nearly $2000.

Symptoms of Poisoning.—The symptoms of poisoning, as reported by stock owners, are practically the same for all of the species. As observed by Dr. Wilcox and the writer in the case of sheep, the most prominent symptoms in the early stages were uneasiness, staggering, frothing. The difficulty in the breathing was prominent until death, but the rate became fast and the inhalation exceedingly shallow. The later stage was sharply distinguished, both from the symptoms of the water hemlock and larkspur poisoning, by the almost complete collapse of nervous energy, the animals often lying on the side, apparently dead, for many hours. The pulse remains nearly normal throughout, the functions of the brain are not much impaired, and there is little disturbance in the digestive system except in the cases of very young animals poisoned by the milk of their mothers. These lambs frequently die from an acute dysentery within a few hours after sucking. Adult sheep also die inside of two or three hours when a considerable quantity of the plant is eaten, but they often live from two to three or four days when a small quantity is consumed.

The symptoms in horses and cattle have not been well described. Both animals are killed by eating the plants, but horses, it is said, are more apt to recover. According to the account of a few stockmen, the action seems to be more violent in the case of horses and cattle than in that of sheep, spasms being mentioned as a prominent characteristic for both. This is also the case with rabbits.

Effects of poison shown by post-mortem examination of sheep which have died from eating death camas reveals, as in cases of larkspur poisoning, no important changes in any of the internal organs excepting the heart and lungs. These are filled with dark, unaerated blood, as is also the case in larkspur poisoning. Cases may be easily diagnosed by the character of the contents of the stomach, which nearly always contains undigested fragments of the plants eaten.

Nature of the Poison Contained in the Plant.—The identity of the toxic substance in the various species of poison camas has

not been determined. It seems probable that it may be a sapotoxin-like substance, as its frothing action suggests, but it may be an alkaloid similar to that of veratrine in the various species of veratrum, which are closely allied plants. The physiological action of veratrum is somewhat similar to that caused by the active principle of poison camas. The latter is very fatal, especially when given hypodermically. Experiments made on rabbits and sheep show that the aqueous extract from seven and one-half grains of the fresh leaf is the fatal dose per pound weight in rabbits when given hypodermically, and that the fatal feeding dose of the fresh plant with roots attached is from a half-pound to 1 pound (about 30 to 60 plants) for a sheep weighing about 70 pounds.

Remedies.—Salt, soda, and lard or fat pork are the remedies usually applied by the stockmen in cases of poisoning from these plants, but the results are not satisfactory, and it has been claimed that there is no known antidote. Hypodermic injections of strychnine and atropine, both alone and together, with morphine, were tried by Dr. Wilcox and the writer without success, but the feeding of a permanganate mixture, similar to the one already recommended in the case of poisoning by larkspur, yielded excellent results, even when administration, as already described, is to be recommended at all stages of the poisoning, but it is advisable also to use stimulants in the more advanced stages.

TRACHEOTOMY—M'KILLIP'S NEW METHOD.

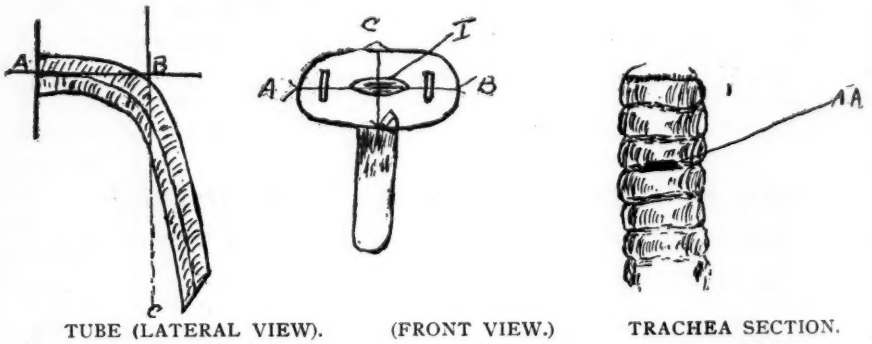
By John J. Millar, V.S., Secretary McKillip Veterinary College, Chicago, Ill.

We have been frequently requested by members of the profession to give our methods adopted in the operation of tracheotomy, and it is thought best to give in detail the *modus operandi* to the profession generally through the valuable pages of the Veterinary Review.

It was with a view of overcoming the many complications

and unsatisfactory results which accompany or follow the operation that a new method seemed inevitable, as it is a well known fact that the operation as it is generally practiced is the means of producing very frequently a much more serious condition than the one for which the operation had originally been performed. This new method has practically overcome the liability to collapse of the tracheal rings and stenosis of the trachea as well as many other complications resulting from the older methods of operating.

The field for the operation should be prepared with a view to absolute (or as nearly as possible) asepsis, and a free incision made (longitudinally) about one and a half inches long, exposing two tracheal rings. Care must, however, be taken so that the cartilage is not injured. An incision is then made through the inter-tracheal ligament (transversely), and this opening need only be sufficient to accommodate the tube. The opening is now dilated with the finger and thumb and the tube, which is supplied with a projecting lip at its lower end, readily drops into position. In the larger truck horses it will be necessary to use a larger tube than is used for the coach horse or thoroughbred, as the accompanying diagram will show.



TUBE (LATERAL VIEW). (FRONT VIEW.) TRACHEA SECTION.

TRUCK HORSE—

A to B, 2 inches. A to B, 4½ inches. AA Opening between tracheal rings through inter-tracheal ligament.
B to C, 4½ inches. C to D, 2¾ inches.

COACH OR THOROUGHBRED—

A to B, 1½ inches. A to B, 3½ inches.
B to C, 4 inches. C to D, 2½ inches.

I, Elliptical tube, size for Truck horse, 1⅔x½ inches.
" " " Coach or Thoroughbred ⅞x⅜ inches.

BRITISH CONGRESS ON TUBERCULOSIS FOR THE PREVENTION OF CONSUMPTION.

THE COMBATING OF TUBERCULOSIS IN THE LIGHT OF THE EXPERIENCE THAT HAS BEEN GAINED IN THE SUCCESSFUL COMBATING OF OTHER INFECTIOUS DISEASES.

By Geh. Med.-Rath Professor Dr. Robert Koch,

Direktor des Instituts für Infektions Kraukheiten in Berlin.

The task with which this Congress will have to busy itself is one of the most difficult, but it is also one in which labor is most sure of its reward.

I need not point again to the innumerable victims tuberculosis annually claims in all countries, nor to the boundless misery it brings on the families it attacks. You all know that there is no disease which inflicts such deep wounds on mankind as this. All the greater, however, would be the general joy and satisfaction if the efforts that are being made to rid mankind of this enemy, which consumes its inmost marrow, were crowned with success.

There are many, indeed, who doubt the possibility of successfully combating this disease, which has existed for thousands of years, and has spread all over the world. This is by no means my opinion. This is a conflict into which we may enter with a surely founded prospect of success, and I will tell you the reasons on which I base this conviction.

Only a few decades ago the real nature of tuberculosis was unknown to us; it was regarded as a consequence, as the expression, so to speak, of social misery, and, as this supposed cause could not be got rid of by simple means, people relied on the probable gradual improvement of social conditions, and did nothing. All this is altered now. We know that social misery does indeed go far to foster tuberculosis, but the real cause of the disease is a parasite—that is, a visible and palpable enemy, which we can pursue and annihilate, just as we can pursue and annihilate other parasitic enemies of mankind.

Strictly speaking, the fact that tuberculosis is a preventible disease ought to have become clear as soon as the tubercle-bacillus was discovered, and the properties of this parasite and the manner of its transmission became known. I may add that I, for my part, was aware of the full significance of this discovery

from the first, and so will everybody have been who had convinced himself of the causal relation between tuberculosis and the tubercle-bacillus. But the strength of a small number of medical men was inadequate to the conflict with a disease so deeply rooted in our habits and customs. Such a conflict requires the coöperation of many, if possible of all, medical men, shoulder to shoulder with the state and the whole population; but now the moment when such coöperation is possible seems to have come. I suppose there is hardly any medical man now who denies the parasitic nature of tuberculosis, and among the non-medical public too the knowledge of the nature of the disease has been widely propagated.

Another favorable circumstance is that success has recently been achieved in the combating of several parasitic diseases, and that we have learned from these examples how the conflict with pestilences is to be carried on.

The most important lesson we have learned from the sad experience is that it is a great blunder to treat pestilences uniformly. This was done in former times; no matter whether the pestilence in question was cholera, plague, or leprosy: isolation, quarantine, useless disinfection were always resorted to. But now we know that every disease must be treated according to its own special individuality, and that the measures to be taken against it must be most accurately adapted to its special nature, to its etiology. We are entitled to hope for success in combating tuberculosis only if we keep this lesson constantly in view. As so extremely much depends just on this point, I shall take the liberty to illustrate it by several examples.

The pestilence which is at this moment in the foreground of interest, the bubonic plague, may be instructive to us in several respects.

People used to act upon the conviction that a plague patient was in the highest degree a centre of infection, and that the disease was transmitted only by plague patients and their belongings. Even the most recent international agreements are based on this conviction. Although, as compared with formerly, we now have the great advantage that we can, with the aid of the microscope and of experiments on animals, recognize every case of plague with absolute certainty, and although the prescribed inspection of ships, quarantine, the isolation of patients, the disinfection of infected dwellings and ships, are carried out with the utmost care, the plague has, nevertheless, been transmitted everywhere, and has in not a few places assumed grave dimen-

sions. Why this has happened we know very well, owing to the experience quite recently gained as to the manner in which the plague is transmitted. It has been discovered that only those plague patients that suffer from plague-pneumonia—a condition which is fortunately infrequent—are centres of infection, and that the real transmitters of the plague are the rats. There is no longer any doubt that, in by far the majority of the cases in which the plague has been transmitted by ocean traffic, the transmission took place by means of plague among the ship rats. It has also been found that, wherever the rats were intentionally or unintentionally exterminated, the plague rapidly disappeared; whereas at other places, where too little attention had been paid to the rat plague, the pestilence continued. This connection between the human plague and the rat plague was totally unknown before, so that no blame attaches to those who devised the measures now in force against the plague if the said measures have proved unavailing. It is high time, however, that this enlarged knowledge of the etiology of the plague be utilized in international as well as in other traffic. As the human plague is so dependent on the rat plague, it is intelligible that protective inoculation and the application of antitoxic serum have had so little effect. A certain number of human beings may have been saved from the disease by that, but the general spread of the pestilence has not been hindered in the least.

With cholera the case is essentially different; it may, under certain circumstances, be transmitted directiy from human beings to other human beings, but its main and most dangerous propagator is water, and therefore, in the combating of cholera, water is the first thing to be considered. In Germany, where this principle has been acted on, we have succeeded for four years in regularly exterminating the pestilence (which was introduced again and again from the infected neighboring countries) without any obstruction of traffic.

Hydrophobia, too, is not void of instruction for us. Against this disease the so-called protective inoculation proper has proved eminently effective as a means of preventing the outbreak of the disease in persons already infected, but, of course, such a measure can do nothing to prevent infection itself. The only real way of combating this pestilence is by compulsory muzzling. In this matter also we have had the most satisfactory experience in Germany, but have at the same time seen that the total extermination of the pestilence can be achieved only by

international measures, because hydrophobia, which can be very easily and rapidly suppressed, is always introduced again year after year from the neighboring countries.

Permit me to mention only one other disease, because it is etiologically very closely akin to tuberculosis, and we can learn not a little for the furtherance of our aims from its successful combating. I mean leprosy. It is caused by a parasite which greatly resembles the tubercle-bacillus. Just like tuberculosis, it does not break out till long after infection, and its course is almost slower. It is transmitted only from person to person, but only when they come into close contact, as in small dwellings and bedrooms. In this disease, accordingly, immediate transmission plays the main part; transmission by animals, water, or the like is out of the question. The combative measures, accordingly, must be directed against this close intercourse between the sick and the healthy. The only way to prevent this intercourse is to isolate the patients. This was most rigorously done in the Middle Ages by means of numerous leper-houses, and the consequence was that leprosy, which had spread to an alarming extent, was completely stamped out in Central Europe. The same method has been adopted quite recently in Norway, where the segregation of lepers has been ordered by a special law. But it is extremely interesting to see how this law is carried out. It has been found that it is not at all necessary to execute it strictly, for the segregation of only the worst cases, and even of only a part of these, sufficed to produce a diminution of leprosy. Only so many infectious cases had to be sent to the leper-houses that the number of fresh cases kept regularly diminishing from year to year. Consequently the stamping-out of the disease has lasted much longer than it would have lasted if every leper had been inexorably consigned to a leper-house, as in the Middle Ages; but in this way, too, the same purpose is gained, slowly indeed, but without any harshness.

These examples may suffice to show what I am driving at, which is to point out that, in combating pestilences, we must strike at the root of the evil, and must not squander force in subordinate ineffective measures. Now the question is whether what has hitherto been done, and what is about to be done against tuberculosis really strikes at the root of tuberculosis, so that it must sooner or later die.

In order to answer this question it is necessary first and foremost to inquire how infection takes place in tuberculosis.

Of course, I presuppose that we understand by tuberculosis only those morbid conditions which are caused by the tubercle-bacillus.

In by far the majority of cases of tuberculosis the disease has its seat in the lungs, and has also begun there. From this fact it is justly concluded that the germs of the disease, *i. e.*, the tubercle-bacilli, must have got into the lungs by inhalation. As to the question where the inhaled tubercle-bacilli have come from, there is also no doubt. On the contrary, we know with certainty that they get into the air with the sputum of consumptive patients. This sputum, especially in advanced stages of the disease, almost always contains tubercle-bacilli, sometimes in incredible quantities. By coughing, and even speaking, it is flung into the air in little drops, *i. e.*, in a moist condition, and can at once infect persons who happen to be near the coughers. But then it may also be pulverized when dried, in the linen or on the floor, for instance, and get into the air in the form of dust.

In this manner a complete circle, a so-called *circulus vitiosus*, has been formed for the process of Infection, from the diseased lung, which produces phlegm and pus containing tubercle-bacilli, to the formation of moist and dry particles (which, in virtue of their smallness, can keep floating a good while in the air), and finally to new Infection, if particles penetrate with the air into a healthy lung and originate the disease anew. But the tubercle-bacilli may get to other organs of the body in the same way, and thus originate other forms of tuberculosis. This, however, is a considerably rarer case. The sputum of consumptive people, then, is to be regarded as the main source of the Infection of tuberculosis. On this point, I suppose, all are agreed. The question now arises whether there are not other sources, too, copious enough to demand consideration in the combating of tuberculosis.

Great importance used to be attached to the hereditary transmission of tuberculosis. Now, however, it has been demonstrated by thorough investigation that, though hereditary tuberculosis is not absolutely non-existent, it is nevertheless extremely rare, and we are at liberty, in considering our practical measures, to leave this form of origination entirely out of account.

But another possibility of tubercular infection exists, as is generally assumed, in the transmission of the germs of the disease from tubercular animals to man. This manner of in-

fection is generally regarded nowadays as proved, and as so frequent that it is even looked upon by not a few as the most important, and the most rigorous measures are demanded against it. In this Congress also the discussion of the danger with which the tuberculosis of animals threatens man will play an important part. Now, as my investigations have led me to form an opinion .deviating from that which is generally accepted, I beg your permission, in consideration of the great importance of this question, to discuss it a little more thoroughly.

Genuine tuberculosis has hitherto been observed in almost all domestic animals, and most frequently in poultry and cattle. The tuberculosis of poultry, however, differs so much from human tuberculosis that we may leave it out of account as a possible source of infection for man. So, strictly speaking, the only kind of animal tuberculosis remaining to be considered is the tuberculosis of cattle, which, if really transferable to man, would indeed have frequent opportunities of infecting human beings through the drinking of the milk and the eating of the flesh of diseased animals.

Even in my first circumstantial publication on the etiology of tuberculosis I expressed myself regarding the identity of human tuberculosis and bovine tuberculosis with reserve. Proved facts which would have enabled me sharply to distinguish these two forms of the disease were not then at my disposal, but sure proofs of their absolute identity were equally undiscoverable, and I therefore had to leave this question undecided In order to decide it, I have repeatedly resumed the investigations relating to it, but so long as I experimented on small animals, such as rabbits and guinea-pigs, I failed to arrive at any satisfactory result, though indications which rendered the difference of the two forms of tuberculosis probable were not wanting. Not till the complaisance of the Ministry of Agriculture enabled me to experiment on cattle, the only animals really suitable for these investigations, did I arrive at absolutely conclusive results. Of the experiments which I have carried out during the last two years along with Professor Schütz, of the Veterinary College in Berlin, I will tell you briefly some of the most important.

A number of young cattle which had stood the tuberculin test, and might therefore be regarded as free from tuberculosis, were infected in various ways with pure cultures of tubercle-bacilli taken from cases of human tuberculosis; some of them got the tubercular sputum of consumptive patients direct. In

some cases the tubercle-bacilli or the sputum were injected under the skin, in others into the peritoneal cavity, in others into the jugular vein. Six animals were fed with tubercular sputum almost daily for seven or eight months; four repeatedly inhaled great quantities of bacilli, which were distributed in water, and scattered with it in the form of spray. None of these cattle (there were nineteen of them) showed any symptoms of disease, and they gained considerably in weight. From six to eight months after the beginning of the experiments they were killed. In their internal organs not a trace of tuberculosis was found. Only at the places where the injections had been made small suppurative foci had formed, in which few tubercle-bacilli could be found. This is exactly what one finds when one injects dead tubercle-bacilli under the skin of animals liable to contagion. So the animals we experimented on were affected by the living bacilli of human tuberculosis exactly as they would have been by dead ones; they were absolutely insusceptible to them.

The result was utterly different, however, when the same experiment was made on cattle free from tuberculosis with tubercle-bacilli that came from the lungs of an animal suffering from bovine tuberculosis. After an incubation-period of about a week the severest tubercular disorders of the internal organs broke out in all the infected animals. It was all one whether the infecting matter had been injected only under the skin or into the peritoneal cavity or the vascular system. High fever set in, and the animals became weak and lean; some of them died after a month and a half to two months, others were killed in a miserably sick condition after three months. After death extensive tubercular infiltrations were found at the place where the injections had been made, and in the neighboring lymphatic glands, and also far advanced alterations of the internal organs, especially the lungs and the spleen. In the cases in which the injection had been made into the peritoneal cavity the tubercular growths which are so characteristic of bovine tuberculosis were found on the omentum and peritoneum. In short, the cattle proved just as susceptible to Infection by the bacillus of bovine tuberculosis as they had proved insusceptible to Infection by the bacillus of human tuberculosis. I wish only to add that preparations of the organs of the cattle which were artificially infected with bovine tuberculosis in these experiments are exhibited in the Museum of Pathology and Bacteriology.

An almost equally striking distinction between human and bovine tuberculosis was brought to light by a feeding experi-

ment with swine. Six young swine were fed daily for three months with the tubercular sputum of consumptive patients. Six other swine received bacilli of bovine tuberculosis with their food daily for the same period. The animals that were fed with sputum remained healthy and grew lustily, whereas those that were fed with the bacilli of bovine tuberculosis soon became sickly, were stunted in their growth, and half of them died. After three months and a half the surviving swine were all killed and examined. Among the animals that had been fed with sputum no trace of tuberculosis was found, except here and there little nodules in the lymphatic glands of the neck, and in one case a few grey nodules in the lungs. The animals, on the other hand, which had eaten bacilli of bovine tuberculosis had, without exception (just as in the cattle experiment), severe tubercular diseases, especially tubercular infiltration of the greatly enlarged lymphatic glands of the neck and of the mesentric glands, and also extensive tuberculosis of the lungs and the spleen.

The difference between human and bovine tuberculosis appeared not less strikingly in a similar experiment with asses, sheep, and goats, into whose vascular systems the two kinds of tubercle-bacilli were injected.

Our experiments, I must add, are not the only ones that have led to this result. If one studies the older literature of the subject, and collates the reports of the numerous experiments that were made in former times by Chauveau, Günther and Harms, Bollinger, and others, who fed calves, swine, and goats with tubercular material, one finds that the animals that were fed with the milk and pieces of the lungs of tubercular cattle always fell ill of tuberculosis, whereas those that received human material with their food did not. Comparative investigations regarding human and bovine tuberculosis have been made very recently in North America by Smith, Dinwiddie and Frothingham, and their result agreed with that of ours. The unambiguous and absolutely conclusive result of our experiments is due to the fact that we chose methods of Infection which exclude all sources of error, and carefully avoided everything connected with the stalling, feeding, and tending of the animals that might have a disturbing effect on the experiments.

Considering all these facts, I feel justified in maintaining that human tuberculosis differs from bovine, and cannot be transmitted to cattle. It seems to me very desirable, however,

that these experiments should be repeated elsewhere, in order that all doubt as to the correctness of my assertion may be removed.

I wish only to add that, owing to the great importance of this matter, the German Government has appointed a commission to make further inquiries on the subject.

But, now, how is it with the susceptibility of man to bovine tuberculosis? This question is far more important to us than that of the susceptibility of cattle to human tuberculosis, highly important as that is too. It is impossible to give this question a direct answer, because, of course, the experimental investigation of it with human beings is out of the question. Indirectly, however, we can try to approach it. It is well known that the milk and butter consumed in great cities very often contain large quantities of the bacilli of bovine tuberculosis in a living condition, as the numerous infection experiments with such dairy products on animals have proved. Most of the inhabitants of such cities daily consume such living and perfectly virulent bacilli of bovine tuberculosis, and unintentionally carry out the experiment which we are not at liberty to make. If the bacilli of bovine tuberculosis were able to infect human beings, many cases of tuberculosis caused by the consumption of alimenta containing tubercle-bacilli could not but occur among the inhabitants of great cities, especially the children. And most medical men believe that this is actually the case.

In reality, however, it is not so. That a case of tuberculosis has been caused by alimenta can be assumed with certainty only when the intestine suffers first—*i. e.*, when a so-called primary tuberculosis of the intestine is found. But such cases are extremely rare. Among many cases of tuberculosis examined after death, I myself remember having seen primary tuberculosis of the intestine only twice. Among the great post-mortem material of the Charité Hospital in Berlin ten cases of primary tuberculosis of the intestine occurred in five years. Among 933 cases of tuberculosis in children at the Emperor and Empress Frederick's Hospital for Children, Baginsky never found tuberculosis of the intestine without simultaneons disease of the lungs and the bronchial glands. Among 3104 post mortems of tubercular children, Biedert observed only sixteen cases of primary tuberculosis of the intestine. I could cite from the literature of this subject many more statistics of the same kind, all indubitably showing that primary tuberculosis of the intestine, especially among children, is a comparatively rare disease,

and of these few cases that have been enumerated, it is by no means certain that they were due to Infection by bovine tuberculosis. It is just as likely that they were caused by the widely propagated bacilli of human tuberculosis, which may have got into the digestive canal in some way or other—for instance, by swallowing saliva of the mouth. Hitherto nobody could decide with certainty in such a case whether the tuberculosis of the intestine was of human or of animal origin. Now we can diagnose them. All that is necessary is to cultivate in pure culture the tubercle-bacilli found in the tubercular material, and to ascertain whether they belong to bovine tuberculosis by inoculating cattle with them. For this purpose I recommend subcutaneous injection, which yields quite specially characteristic and convincing results. For half a year past I have occupied myself with such investigations, but, owing to the rareness of the disease in question, the number of the cases I have been able to investigate is but small. What has hitherto resulted from this investigation does not speak for the assumption that bovine tuberculosis occurs in man.

Though the important question whether man is susceptible to bovine tuberculosis at all is not yet absolutely decided, and will not admit of absolute decision to-day or to-morrow, one is nevertheless already at liberty to say that, if such a susceptibility really exists, the infection of human beings is but a very rare occurrence. I should estimate the extent of infection by the milk and flesh of tubercular cattle, and the butter made of their milk, as hardly greater than that of hereditary transmission, and I therefore do not deem it advisable to take any measures against it.

So the only main source of the Infection of tuberculosis is the sputum of consumptive patients, and the measures for the combating of tuberculosis must aim at the prevention of the dangers arising from its diffusion. Well, what is to be done in this direction? Several ways are open. One's first thought might be to consign all persons suffering from tuberculosis of the lungs, whose sputum contains tubercle-bacilli to suitable establishments. This, however, is not only absolutely impracticable, but also unnecessary. For a consumptive who coughs out tubercle-bacilli is not necessarily a source of Infection on that account, so long as he takes care that his sputum is properly removed and rendered innocuous. This is certainly true of very many patieuts, especially in the first stages, and also of those who belong to the well-to-do classes, and are able to procure the necessary nursing. But how is it with people of very

small means? Every medical man who has often entered the dwellings of the poor, and I can speak on this point from my own experience, knows how sad is the lot of consumptives and their families there. The whole family have to live in one or two small, ill ventilated rooms. The patient is left without the nursing he needs, because the able-bodied members of the family must go to their work. How can the necessary cleanliness be secured under such circumstances? How is such a helpless patient to remove his sputum, so that it may do no harm? But let us go a step further and picture the condition of a poor consumptive patient's dwelling at night. The whole family sleep crowded together in one small room. However cautious he may be, the sufferer scatters the morbid matter secreted by his diseased lungs every time he coughs, and his relatives close beside him must inhale this poison. Thus whole families are infected. They die out, and awaken in the minds of those who do not know the infectiousness of tuberculosis the opinion that it is hereditary, whereas its transmission in the cases in question was due solely to the simplest processes of Infection, which do not strike people so much, because the consequences do not appear at once, but generally only after the lapse of years.

Often, under such circumstances, the Infection is not restricted to a single family, but spread in densely inhabited tenement houses to the neighbors, and then, as the admirable investigations of Biggs have shown in the case of the densely peopled parts of New York, regular nests or foci of disease are formed. But, if one investigates these matters more thoroughly, one finds that it is not poverty *per se* that favors tuberculosis, but the bad domestic conditions under which the poor everywhere, but especially in great cities, have to live. For, as the German statistics show, tuberculosis is less frequent even among the poor, when the population is not densely packed together, and may attain very great dimensions among a well-to-do population when the domestic conditions, especially as regards the bedrooms, are bad, as is the case, for instance, among the inhabitants of the North Sea coast. So it is the overcrowded dwellings of the poor that we have to regard as the real breeding places of tuberculosis; it is out of them that the disease always crops up anew, and it is to the abolition of these conditions that we must first and foremost direct our attention if we wish to attack the evil at its root, and to wage war against it with effective weapons.

This being so, it is very gratifying to see how efforts are being made in almost all countries to improve the domestic con-

ditions of the poor. I am also convinced that these efforts, which must be promoted in every way, will lead to a considerable diminution of tuberculosis. But a long time must elapse ere essential changes can be effected in this direction, and much may be doue meanwhile in order to reach the goal much more rapidly.

If we are not able at present to get rid of the danger which small and overcrowded dwellings involve, all we can do is to remove the patients from them, and, in their own interests and that of the people about them, to lodge them better; and this can be done only in suitable hospitals. But the thought of attaining this end by compulsion of any kind is very far from me, what I want is that the consumptives may be enabled to obtain the nursing they need better than they can obtain it now. At present a consumptive in an advanced stage of the disease is regarded as incurable and as an unsuitable inmate for a hospital. The consequence is that he is reluctantly admitted and dismissed as soon as possible. The patient too, when the treatment seems to him to produce no improvement, and the expenses, owing to the long duration of his illness, weigh heavily upon him, is himself animated by the wish to leave the hospital soon. That would be altogether altered if we had special hospitals for consumptives, and if the patients were taken care of there for nothing, or at least at a very moderate rate. To such hospitals they would willingly go; they could be better treated and cared for there than is now the case. I know very well that the execution of the project will have great difficulties to contend with, owing to the considerable outlay it entails. But very much would be gained if, at least in the existing hospitals, which have to admit a great number of consumptives at any rate, special wards were established for them, in which pecuniary facilities would be offered them. If only a considerable fraction of the whole number of consumptives were suitably lodged in this way, a diminution of infection and consequently of the sum-total of tuberculosis could not fail to be the result. Permit me to remind you in this connection of what I said about leprosy. In the combating of that disease also great progress has already been made by lodging only a fair number of the patients in hospitals. The only country that possesses a considerable number of special hospitals for tubercular patients is England, and there can be no doubt that the diminution of tuberculosis in England, which is much greater than in any other country, is greatly due to this circumstance. I should point to the found-

ing of special hospitals for consumptives and the better utilization of the already existing hospitals for the lodging of consumptives as the most important measure in the combating of tuberculosis, and its execution opens a wide field of activity to the state, to municipalities, and to private benevolence. There are many people who possess great wealth, and would willingly give of their superfluity for the benefit of their poor and heavily afflicted fellow creatures, but do not know how to do this in a judicious manner. Here is an opportunity for them to render a real and lasting service by founding consumption hospitals, or purchasing the right to have a certain number of consumptive patients maintained in special wards of other hospitals free of expense.

As, however, unfortunately, the aid of the state, the municipalities, and rich benefactors will probably not be forthcoming for a long time yet, we must for the present resort to other measures that may pave the way for the main measure just referred to, and serve as a supplement and temporary substitute for it.

Among such measures I regard obligatory notification as specially valuable. In the combating of all infectious diseases it has proved indispensable as a means of obtaining certain knowledge as to their state, especially their dissemination, their increase and decrease. In the conflict with tuberculosis also we cannot dispense with obligatory notification; we need it not only in order to inform ourselves as to the dissemination of this disease, but mainly in order to learn where help and instruction can be given, and especially where the disinfection which is so urgently necessary when consumptives die or change their residences has to be effected. Fortunately it is not at all necessary to notify all cases of tuberculosis, nor even all cases of consumption, but only those that, owing to the domestic conditions, are sources of danger to the people about them. Such limited notification has already been introduced in various places, in Norway, for instance, by a special law, in Saxony by a ministerial degree, in New York and in several American towns, which have followed its example. In New York, where notification was optional at first and was afterwards made obligatory, it has proved eminently useful. It has thus been proved that the evils which it used to be feared the introduction of notification for tuberculosis would bring about need not occur, and it is devoutly to be wished that the examples I have named may very soon excite emulation everywhere.

There is another measure, closely connected with notification, viz., disinfection, which, as already mentioned, must be effected when consumptives die or change their residence, in order that those who next occupy the infected dwelling may be protected against infection. Moreover, not only the dwellings but also the infected beds and clothes of consumptives ought to be disinfected.

A further measure already recognized on all hands as effective, is the instructing of all classes of the people as to the infectiousness of tuberculosis, and as to the best way of protecting one's self. The fact that tuberculosis has considerabiy diminished in almost all civilized states of late is attributable solely to the circumstance that knowledge of the contagious character of tuberculosis has been more and more widely disseminated, and that caution in intercourse with consumptives has increased more and more in consequence. If better knowledge of the nature of tuberculosis has alone sufficed to prevent a large number of cases, this must serve us as a significant admonition to make the greatest possible use of this means, and to do more and more to bring it about that everybody may know the dangers that threaten them in intercourse with consumptives. It is only to be desired that the instructions may be made shorter and more precise than they generally are, and that special emphasis be laid on the avoidance of the worst danger of infection, which is the use of bedrooms and small ill-ventilated workrooms simultaneously with consumptives. Of course the instructions must include directions as to what consumptives have to do when they cough and how they are to treat their sputum.

Another measure, which has come into the foreground of late, and which at this moment plays to a certain extent a paramount part in all efforts for the combating of tuberculosis, works in quite another direction. I mean the founding of sanatoria for consumptives.

That tuberculosis is curable in its early stages must be regarded as an undisputed fact. The idea of curing as many tubercular patients as possible in order to reduce the number of those that reach the infectious stage of consumption, and thus to reduce the number of fresh cases, was therefore a very natural one. The only question is whether the number of persons cured in this way will be great enough to exercise an appreciable influence on the retrogression of tuberculosis. I will try to answer this question in the light of the figures at my disposal.

According to the business report of the German Central Committee for the Establishment of Sanatoria for the Cure of Consumptives, about 5500 beds will be at the disposal of these institutions by the end of 1901, and then, if we assume that the average stay of each patient will be three months, it will be possible to treat at least 20,000 patients every year. From the reports hitherto issued as to the results that have been achieved in the establishments we learn further that about 20 per cent. of the patients that have tubercle-bacilli in their sputum lose them by the treatment there. This is the only sure test of success, especially as regards prophylaxis. If we make this the basis of our estimates, we find that 4000 consumptives will leave these establishments annually as cured. But, according to the statistics ascertained by the German Imperial Office of Health, there are 226,000 persons in Germany over fifteen years of age who are so far gone in consumption that hospital treatment is necessary for them. Compared with this great number of consumptives the success of the establishments in question seems so small that a material influence on the retrogression of tuberculosis in general is not yet to be expected of them. But pray do not imagine that I wish, by this calculation of mine, to oppose the movement for the establishment of such sanatoria in any way, I only wish to warn against the over-estimating of their importance which has recently been observable in various quarters, based apparently on the opinion that the war against tuberculosis can be waged by means of sanatoria alone, and that other measures are of subordinate value. In reality the contrary is the case. What is to be achieved by the general prophylaxis resulting from recognition of the danger of infection and the consequent greater caution in intercourse with consumptives is shown by a calculation of Cornet's regarding the decrease of mortality from tuberculosis in Prussia in the years 1889 to 1897. Before 1889 the average was 31.4 per 10,000, whereas in the period named it sank to 21.8, which means that, in that short space of time, the number of deaths from tuberculosis was 184,000 less than was to be expected from the average of the preceding years. In New York, under the influence of the general sanitary measures directed in a simply exemplary manner by Beggs, the mortality from tuberculosis has diminished by more than 35 per cent. since 1886. And it must be remembered that both in Prussia and New York the progress indicated by these figures is due to the first beginnings of these measures. Considerably greater success is to be expected of their further

development. Beggs hopes to have got so far in five years that in the city of New York alone the annual number of deaths from tuberculosis will be 3000 less than formerly. I take this opportunity of most urgently recommending Dr. Beggs' organization to the study and imitation of all municipal sanitary authorities.

Now, I do indeed believe that it will be possible to render the sanatoria considerably more efficient. If strict care be taken that only patients be admitted for whom the treatment of those establishments is well adapted, and if the duration of the treatment be prolonged, it will certainly be possible to cure fifty per cent., and perhaps still more. But even then, and even if the number of the sanatoria be greatly increased, the total effect will always remain but moderate. The sanatoria will never render the other measures I have mentioned superfluous. If their number become great, however, and if they perform their functions properly, they may materially aid the strictly sanitary measures in the conflict with tuberculosis.

If now, in conclusion, we glance back once more to what has been done hitherto for the combating of tuberculosis, and forward to what has still to be done, we are at liberty to declare with a certain satisfaction that very promising beginnings have already been made. Among these I reckon the consumption hospitals of England, the legal regulations regarding notification in Norway and Saxony, the organization created by Beggs in New York, the sanatoria, and the instruction of the people. All that is necessary is to go on developing these beginnings, to test, and if possible to increase their influence on the diminution of tuberculosis, and wherever nothing has yet been done, to do likewise.

If we are continually guided in this enterprise by the spirit of genuine preventive medical science, if we utilize the experience gained in conflict with other pestilences, and aim, with clear recognition of the purpose and resolute avoidance of wrong roads, at striking the evil at its root, then the battle against tuberculosis, which has been so energetically begun, cannot fail to have a victorious issue.

TUBERCLE BACILLI IN COWS' MILK AS A POSSIBLE SOURCE OF TUBERCULOUS DISEASE IN MAN.

By Professor John McFadyean, M.B., M.R.C.V.S.

As recently as a few days ago, when I was mentally arranging the material for the paper which I have now the great honor

of submitting to this Congress, I was under the impression that it would not be necessary to formally prove that the term tuberculosis as it is now employed by medical men and veterinary surgeons relates to one and the same disease. I thought that I might ask my audience to accept it as proved, and generally admitted, that tuberculosis in man is caused by a single definite species of organism—the tubercle bacillus—that this organism is also the cause of the disease to which veterinary surgeons apply the term tuberculosis in the case of cattle and other domesticated species, and that there therefore existed a *prima facie* case against the germs formed in the bodies of tuberculous animals as a possible source of tuberculous disease in human beings.

To-day, however, the position of any one who undertakes to discuss the inter-communicability of human and bovine tuberculosis is very different from what it would have been a week ago, for in the interval the greatest living authority on tuberculosis—the world-renowned discoverer of the tubercle bacillus, and the man to whom we are mainly indebted for our knowledge of the cause of tuberculosis—has declared his conviction that human and bovine tuberculosis are practically two distinct diseases. I do not know how far the reasons assigned by Dr. Koch for the opinion which he now holds on this question may have commended themselves to the members of this Congress, and I am overwhelmed at finding myself in a position which compels me to offer some criticism on the pronouncement of one the latchet of whose shoes I am not worthy to unloose.

That bovine and human tuberculosis are identical diseases was generally supposed to have been finally determined by Dr. Koch himself, when he discovered that the human and the bovine lesions contained bacilli that were identical in morphological, tinctorial, and cultural characters, and showed that the artificial cultures from both sources produced indistinguishable effects when they were employed to infect a variety of animals. The labors of hundreds of workers during the succeeding eighteen years produced nothing in serious conflict with the conclusion that human and bovine tuberculosis were identical diseases, but they brought to light what appeared to be additional evidence of this identity, such as the discovery that tuberculin produced a specific reaction in tuberculous cattle, whether human or bovine bacilli had been employed in its preparation. In short, the identity of the bacilli from the two sources appeared to be as firmly established as any other generally ac-

cepted opinion regarding the identity or non-identity of bacteria associated with disease in more than one species of animal. Since it thus appeared to be proved that the only difference between human and bovine tubercle bacilli lay in their accidentally different position—one being parasitic in man and the other in cattle—it was natural to conclude that, when circumstances were favorable for the transference of bacilli from one species to the other, human tuberculosis might have an animal origin, and *vice versa*.

Opinions varied as to the frequency with which this transmission of tuberculosis from one species to the other occurred, but practically never within the last eighteen years regarding the possibility and probability of such reciprocal infection. What are the grounds upon which we are asked to discard convictions that appeared to rest on such a solid basis? I shall endeavor to state them briefly, as I understand Dr. Koch's train of reasoning.

(1) The bacilli found in cases of bovine tuberculosis are much more virulent for cattle and other domestic quadrupeds than the bacilli found in cases of human tuberculosis.

(2) This difference is so marked and so constant that it may be relied upon as a means of distinguishing the bacilli of bovine tuberculosis from those of the human disease, even assuming that the former may occasionally be found as a cause of disease in man.

(3) If bovine bacilli are capable of causing disease in man, there are abundant opportunities for the transference of the bacilli from the one species to the other, and cases of primary intestinal tuberculosis from the consumption of tuberculous milk ought to be of common occurrence. But post-mortem examination of human beings proves that cases of primary intestinal tuberculosis are extremely rare in man, and therefore it must be concluded that the human subject is immune against infection with the bovine bacilli, or is so slightly susceptible that it is not necessary to take any steps to counteract the risk of infection in this way.

Now, with the utmost diffidence I venture to submit that at least one of the premises contained in this argument is not well founded, that the others have little or no bearing on the question, and that there still remain reasonable grounds for regarding tuberculous cows' milk as distinctly dangerous to human beings.

It cannot be denied that what may be called bovine tubercle

bacilli are as a rule distinctly more virulent for cattle and other domesticated animals than human bacilli, or that the results of experiments indicate that in natural circumstances there is little danger of cattle becoming infected from human beings. But it cannot be admitted that the low virulence of human bacilli for cattle proves, or even makes it probable, that bovine bacilli have only a feeble pathogenic power for man. That might have been held to be probable if it had been shown that bovine bacilli were very virulent only for cattle, but since it is well established that these bacilli are highly dangerous for such diverse species as the rabbit, horse, dog, pig, and sheep, and, in short, for almost every quadruped on which they have been tried, it appears to be highly probable that they are also dangerous to man. At any rate it is impossible to cite any ascertained fact relating to other bacterial diseases that makes the contrary conclusion probable. It is well known that the majority of disease-exciting bacteria are harmful to only one or two species, but all those that are common to all the domesticated animals are also pathogenic to man.

With regard to the view that the difference between human and bovine bacilli in respect of virulence for cattle is of such a fixed and constant character that it may be relied upon to distinguish the one from the other, it need only be said that that is very far from proved. It appears to be quite possible that what may be called the normal or average virulence of bovine bacilli for cattle may be reduced by passage through the human subject. Besides, there are very great differences in the virulence of tubercle bacilli found in animals of the same species, and if a low degree of virulence for cattle is to be taken as the distinguishing feature of human bacilli, there will be no difficulty in proving that the human disease is sometimes transmitted to the lower animals.

The third proposition in Dr. Koch's argument is the only one which is really germane to the point at issue, viz., that only cases of primary intestinal tuberculosis can possibly have had their origin in infected milk or meat, and that "such cases are extremely rare." Dr. Koch refers to several large series of post-mortem observations that appear to justify this statement, and adds that he could have cited many more pointing to the same conclusion. Now, if it were a fact that all the statistics relating to this point were unanimous, it would have to be admitted that primary intestinal tuberculosis is rare in the human subject, and that cases of infection through milk are still rarer,

though even then it might be advisable to take measures to prevent the few cases. But the statistics are not by any means unanimous, and those that are likely to appeal with most force to the people in this country are not at all in accord with those quoted from Germany. During the last few years the evidence obtainable from the post-mortem records of two of the largest hospitals for children in this country have been analyzed with great care, in order to see what evidence they afforded as to the relative frequency of the different methods of infection in tuberculosis. In the case of the Hospital for Sick Children in Great Ormond Street this has been done by Dr. George Still, and in the case of the Royal Hospital for Sick Children in Edinburgh by Dr. Shennan. The conclusion at which Dr. Still arrived was that in 29.1 per cent. of the cases of tuberculosis in children primary infection appeared to have taken place through the intestine. That is very far from being an insignificant proportion, and it is a striking fact that Dr. Shennan arrived at an almost identical conclusion, and estimated that 28.1 per cent. of the cases of tuberculosis among children in Edinburgh are due to alimentary infection. There does not appear to be any ground for supposing that there is a large margin of error in these statistics, as the number of cases dealt with was considerable (547 in the two series), and in both series the post-mortem appearances were interpreted in a way to which no exception can be taken. In face of these statistics it is not possible to assent to the statement that cases of primary tuberculosis of the alimentary canal are extremely rare. Precisely the contrary conclusion is the one that must in the meanwhile be drawn with regard to the state of affairs in this country, viz., that, at least in children, primary infection by way of the alimentary canal is comparatively common.

I therefore submit that there is still a strong *prima facie* case against animal tuberculosis as a possible source of human tuberculosis, and it becomes necessary to consider whether there are any data from which one may estimate the extent of the danger to which human beings are exposed through the occurrence of tubercle bacilli in milk.

The evidence in favor of the view that the ingestion of tuberculous milk is one of the causes of human tuberculosis includes a number of recorded cases in which the relationship of cause and effect appeared to be obvious. From the nature of the circumstances, evidence of this kind is very scanty, and it must be admitted that very few of the alleged examples are abso-

lutely convincing. Tuberculosis is a disease that develops slowly, and, assuming for the moment that tubercle bacilli do occur in milk, and are a cause of disease in persons consuming such milk, it is obvious that, as a rule, the very act by which the infection is brought about destroys the only direct evidence of cause and effect that exists.

One could only expect to be able to trace the disease to the milk when, after the onset of symptoms pointing to infection by way of the mouth, the cow from which the milk had been obtained was still available for examination. In practice this is rarely the case, and it is therefore not surprising that medical literature contains very few specific instances of the infection of human beings with tuberculosis by means of milk. It is obvious, however, that the entire absence of evidence of this kind would in no way exonerate milk from the suspicion of being one of the causes of human tuberculosis.

We have already seen that, at least in this country, in a considerable number of cases of tuberculosis occurring in early life, the first seeds of the disease appear to have entered the body by way of the mouth. What proportion of these cases ought to be ascribed to tubercle-infected milk? It scarcely appears to be possible to give a very confident reply to this question, though some distinguished authorities have not hesitated to express the opinion that practically all the cases of primary intestinal tuberculosis occurring in childhood may be set down to this cause. The late Sir Richard Thorne Thorne, in the Harben Lectures on the administrative control of tuberculosis, which he delivered in 1898, expressed his conviction that tuberculous milk was the main cause of *tabes mesenterica* in children, and he characterized the loss of child life from this cause as appalling. The evidence on which this formidable charge was laid against the milch cow was of the following nature. The Registrar-General's returns show that during the last fifty years there has been a marked decline in the death-rate from human phthisis, which is the form that tuberculosis generally takes when the bacilli are inhaled. On the other hand, during the same period there has been only a slight decline in the death-rate at all ages from that form of tuberculosis which is ascribable to alimentary infection, and among children under one year of age there has been a notable increase in the mortality from that form of the disease. The decline in the death-rate from phthisis is ascribable to the great improvements which have been effected during the last fifty years in the hygiene of human habitations, such as im-

provements in lighting, drainage, and ventilation. These, naturally, have not interfered with infection through milk, which has therefore remained unchecked, and in infants has even increased, because, during the last fifty years, cows' milk has entered more largely into the dietary of very young children.

There are several weak points in this argument. Perhaps the weakest of all is the assumption that the deaths certified under the head of *tabes mesenterica* correspond closely with those which the pathologist would classify as cases of primary alimentary infection. It is scarcely possible to doubt that the term *tabes mesenterica* in the Registrar-General's Returns covers a heterogeneous collection of cases, of which the majority may not be cases of tuberculosis at all. But even if it is agreed to accept all the cases registered under the head of *tabes mesenterica* as instances of primary alimentary infection, the figures found in the Registrar-General's Returns do not support the contention that milk is responsible for all the cases of *tabes*. It is true that they indicate an increase in the death-rate from alimentary tuberculosis among children under twelve months' old, but, on the other hand, there appears to have been a considerable decline in the death-rate from the same cause at all ages between one and five years. Now, if tuberculous milk were a frequent cause of tuberculosis, one would not have expected the death-rate from that cause to decline among children between one and five years of age, for there is no reason to suppose that there has been any decline in the use of cows' milk in the feeding of children at that age during the last fifty years. The fact appears to be that the Registrar-General's Returns do not afford much trustworthy information with regard to the number of cases of primary alimentary tuberculosis, and are absolutely worthless as an indication of the extent to which human beings are infected by means of milk.

There is another direction in which one may turn for evidence on this point. We cannot with any pretence to accuracy ascertain the number of persons that annually become infected by milk, but we may be able to form some estimate of the existing danger in this connection by collecting information as to the frequency with which milk contains tubercle bacilli. We know that about thirty per cent. of all the cows giving milk in this country are tuberculous in some degree. This statement no doubt indicates a deplorable state of affairs, but in the present connection it is not quite so alarming as it at first sight appears. Fortunately not every cow that is tuberculous gives milk con-

taining tubercle bacilli. It is true that opinions with regard to this point are not absolutely unanimous, but there is ample evidence to justify the assertion that as a rule the milk is not dangerous until the udder itself becomes diseased. The experiments pointing to an opposite conclusion form only a small minority, and the results obtained in most of them were probably due to carelessness on the part of the experimenter. In a few of the cases in which the milk of an apparently healthy udder was found to be infective, it is probable that the gland tissue was in reality diseased, though not to an extent discoverable without microscopic examination. The important question, therefore, is not what proportion of milch cows are tuberculous, but what proportion of them have tuberculous udders. Some authorities have estimated this to be as high as ten per cent., but the proportion is certainly much less than that in Great Britain. My own experience leads me to think that about two per cent. of the cows in the milking herds in this country are thus affected. Now, the milk secreted by a tuberculous udder always contains tubercle bacilli, and it sometimes contains enormous numbers of them, and when these facts are apprehended one begins to realize the seriousness of the danger to which, in the present state of affairs, those who drink uncooked milk are exposed. But there are one or two considerations that make the danger greater than the mere statement of the number of cows affected would at first sight indicate. In the first place, the udder disease is not attended by any pain or tenderness in milking, and the milk for a considerable time after the udder has become manifestly diseased may appear quite wholesome, though in reality it is charged with the germs of tuberculosis. It therefore often happens that the gravity of the condition is not realized by the milker or the owner of the cow, and the milk continues to be sold for human consumption. There is scarcely any room for doubt that if it were sold and consumed unmixed with other milk, some of the persons partaking of it would become infected. In practice it is usually mixed with the milk from other cows that have healthy udders, and thus the germs are distributed among a larger number of persons. Even tuberculous milk that has been thus much diluted may prove infective, but the danger to the individual consumer is in inverse proportion to the degree of dilution.

Since about one cow in fifty is the subject of tuberculosis of the udder, and the average number of cows in the milking herds of this country is less than fifty, it follows that the majority

of dairies and farms supply milk that is free from tubercle bacilli, or at least does not contain any derived from this source. On the other hand, when the infected material is present, it operates with the greatest intensity in the milk of single cows, and in the mixed milk from small herds.

It must be added that tuberculous disease of the udder is not the only source of tubercle bacilli found in milk. A great deal of the milk in the market contains a considerable quantity of dust and dirt, most of which comes from the cow's udder and the hands of the milker, and part from the dust of the air of the cowshed. When thirty per cent. of the cows in a byre are tuberculous, the dirt in that building, and the atmosphere in it, are almost certain to contain tubercle bacilli, and some of these are very likely to find their way into the milk. The more dirt milk contains, the greater is the chance that tubercle bacilli from that source may be present.

What has been said with regard to the extent of the danger to which the public are exposed through the sale of milk containing tubercle bacilli may be summed up as follows:—The danger cannot be defined by stating how many persons are thus infected annually, or what fraction the persons thus infected form of the total number who contract tuberculosis in the course of a year. At the same time, it is impossible to doubt that the danger is a very real one, since at the present time milk is a vehicle by which tubercle bacilli are often introduced into the bodies of human beings.

MEANS OF AVERTING THE DANGER.

The ideal method of counteracting this source of human disease would be to stamp out bovine tuberculosis, or to prevent the sale of milk from every cow that is tuberculous. Unfortunately, it must be admitted that at present that is unattainable. At the present time probably not less than thirty per cent. of all the breeding and milking cattle in this country are in some degree affected with tuberculosis, and to urge that the disease should be attacked on the lines adopted in dealing with cattle plague and pleuro-pneumonia is an effectual method of preventing any government from touching the subject. But, although the complete and rapid extermination of the disease is impossible, it does not follow that nothing can be done, or ought to be done in the way of prevention. The disease has attained to its present alarming proportions simply because, until quite recently, altogether erroneous notions were held regarding its cause, and because there has hitherto been the most absolute neglect of the

precautions necessary for its prevention. The greatest obstacle to successful action against tuberculosis, whether in man or animals is the ignorance of the laity regarding the cause of the disease. The immense majority of cattle owners are not yet convinced that contagion is the only cause of tuberculosis, and very few of them have yet made the slightest effort to check the spread of the disease. As a rule, cows and other cattle visibly ill from tuberculosis are still left alive and in close association with their fellows, although the lowest grade of common sense and prudence would suggest that such animals ought to be promptly killed, or, at least, isolated. It is not want of common sense, nor is it mainly lack of means, that is responsible for this inaction; it is simply a want of conviction on the part of cattle owners that tuberculous animals are dangerous to their companions.

The first thing necessary in this connection is education of the people regarding the nature of the disease. It is necessary, because in this country, where Parliament never moves except by the force of public opinion, the legislative action required will not be taken unless the people are satisfied of its wisdom, and also because even the most drastic sanitary measures enforced by the law are likely to fail if they are not supplemented by the intelligent coöperation of the people. The National Association for the Prevention of Consumption and the Royal Agricultural Society have been endeavoring to disseminate sound views regarding the cause of bovine tuberculosis among farmers and others, but much remains to be done in this direction. But it is not reasonable to ask that things should be left as they are until the education of the farmer in the matter of tuberculosis has been finished. If there are any practicable and reasonable measures by which, figuratively speaking, the flow of tubercle bacilli from tuberculous cows to healthy human beings can be stopped or impeded, they ought to be immediately enforced.

As soon as the valuable diagnostic properties of tuberculin had been proved by experience, it occurred to a good many people that its assistance ought to be called in in order to exclude tuberculous cows from milking herds. In other words, it was thought that although it might not be practicable to insist upon the application of the tuberculin test to all infected herds, and to compel the isolation or slaughter of all cattle thus found to be infected, it might still be possible to require that only cows found to be free from the disease by the application of the test should be kept for milch purposes. I doubt whether anyone

who is well acquainted with the circumstances of the case now believes this practicable. Here, again, the fact that one-third of the cows now giving milk are tuberculous is an insurmountable obstacle. The cost of carrying out the tuberculin test several times annually in all the milking herds in this country would be enormous, and the exclusion of all reacting cows from such herds would seriously disorganize cattle breeding as well as milk production. Moreover, to rely blindly on the tuberculin test, and to pronounce the milk of every cow that does not react to it free from tubercle bacilli, would be very unsafe. The test is recognized to be one of great value, but it is not infallible. Rather serious defects in connection with it are :—(1) that for a period after infection—a period that is sometimes very considerable—an animal will not react; (2) that in some advanced cases of tuberculosis no distinct reaction is obtainable; and (3) that in a considerable proportion of cases a second reaction is not obtainable for some days or weeks after the first. It is therefore clear that if we wish to exclude the milk of tuberculous cows, or if the object is the more restricted one of preventing the sale of milk from tuberculons udders, some system of inspection is necessary. This was the conclusion at which the Second Royal Commission on Tuberculosis arrived. We have already seen that whatever danger attaches to milk comes mainly from the cows with tuberculosis of the udder, and the public health would be almost entirely safeguarded from this danger if we could exclude such animals from our dairies. Periodic examination by competent inspectors would go a long way to securing this object, but the inspection would require to be at rather short intervals, for a tuberculosis of the udder may come into existence and attain most dangerous dimensions in a period of a few weeks. The more frequent the inspection the better, but, of course, this means a great deal of expense.

If every town and rural district produced its own milk, it would be a comparatively simple problem to organize and carry out a fairly efficient system of inspection of milch cows; but as the law at present stands, the majority of the population cannot obtain this safeguard. With the exception of Glasgow, Manchester, and a few other places, a local authority has no power to inspect cows outside its own district, and the helpless position in which this state of the law leaves the inhabitants of London and other large towns is obvious. If cows of which the milk is sold for human food had everywhere to be submitted to periodic inspection, such inspection would naturally be

undertaken by the various local authorities, each of which would supervise the cows and cowsheds in its own district; but the compulsory inspection of all the milch cows in the country would be a very large undertaking, and perhaps it would be premature to press for it. In the meantime, a good case can be made out for making general the special powers relating to inspection of cows in outside districts which a few fortunate cities have acquired by special Acts of Parliament. This also was one of the directions in which the members of the Second Royal Commission on Tuberculosis considered immediate action to be necessary.

There remain for consideration some other safeguards which would doubtless be less effective than those just discussed, but which, unlike these, would not be difficult to enforce, viz.:—(1) compulsory notification of udder disease and of any symptoms of tuberculosis in milch cows, with, of course, the power to inflict a considerable fine for not reporting; and (2) the interdiction of the sale of milk from any cow suffering from tuberculous disease of the udder, or exhibiting clinical signs of tuberculosis. Against the demand for the amendment of the existing law to the extent of granting the public these very reasonable safeguards against infection through milk it cannot be urged that they would be very expensive, or that they would press harshly on private interests. The present state of the law, or rather the almost entire absence of any law, dealing with tuberculous udder disease in cows is a scandal and a reproach to civilization. It scarcely sounds credible, but it is a fact that the owner of a cow in the most advanced state of tuberculosis, and exhibiting the most manifest signs of udder disease, may sell that cow's milk for human food as long as the sale has not been specially interdicted on the certificate of a veterinary surgeon, and no penalty attaches to this crime of deliberately or carelessly placing on the market a food material charged with the germs of a dangerous disease.

In the interests of public health, the sale of milk from tuberculous udders, and from cows that are obviously tuberculous in any part of the body, must be stopped, and it must be declared illegal to keep such animals alive. There need be no hesitation in pressing for this reform, because the measures demanded are in the interests of the owners of cattle, and would be advisable even if it were established that bovine tuberculosis is not transmissible to man. There is no dispute as to the danger of visibly tuberculous animals to others of their own

species, and it is the very reverse of a hardship to the owner of such animals to insist on their being slaughtered.

It would probably be regarded as a serious omission if I did not refer to one other method of counteracting whatever danger at present attaches to impure milk as a cause of human tuberculosis. No matter how highly charged milk may be with tubercle bacilli, it can be deprived of all danger from that source by raising it to the temperature known to be fatal to these germs. Less than the boiling temperature (212° F.) suffices for this purpose; but, unfortunately, the lowest temperature that can be relied upon imparts to the milk a flavor that many people find distasteful. That objection does not hold good in the case of infants and young children, and the custom of boiling or steaming the nursery milk for a few minutes cannot be made too general. But while abstinence from uncooked milk is a sure way of avoiding infection with bacilli present in that article of food, it cannot for a moment be admitted that this absolves public health authorities from all concern with the subject. Arsenical beer may be made harmless by adding the proper antidote before drinking it, but the most courageous brewer would not plead this as an excuse for selling the impure article.

In conclusion I would venture to express the earnest hope that the Congress will not endorse the view that it is inadvisable to take any measures to prevent the transmission of tuberculosis from the lower animals to human beings. To justify the introduction of measures to that end it is not necessary to contend that this is a common method of infection, or that the danger arising from milk can for a moment be compared with that present in human sputum. The inhalation of tubercle bacilli expelled from the bodies of human patients is doubtless the great cause of human tuberculosis, and every practicable means of preventing infection in that way ought to be employed; but, at the same time, we ought not to concede to the milkmen the right to sell us tubercle bacilli, even if we were assured that—like Dr. Koch's experimental pigs—we had nothing to fear beyond the development of "little nodules here and there in the lymphatic glands" of our necks and "a few grey tubercles" in our lungs.

THE French are recommending the bromhydrate of arecoline subcutaneously injected for azoturia. See Prof. Liautard's "European Chronicles" in this number.

[*ABSTRACT.*]

MEASURES TAKEN AGAINST TUBERCULOSIS IN DENMARK.

By Holzer Rördam,

Chief Physician of the First Class of Naval Marine.

Compared with many other countries in Europe, Denmark remained for a long while behind-hand in the struggle against tuberculosis, but during the last few years the inhabitants have taken up the matter with considerable energy.

The oldest hospital for tuberculous patients is situate in the peninsula *Refsnaes*. It was founded in 1874. It was arranged at first for 100 patients; later it was increased to accommodate 130, without reckoning twelve beds in the establishment for patients suffering from epidemic complaints, and sixteen beds in the ward for ordinary diseases.

The hospital only admits scrofulous children.

The construction of the whole establishment cost about 500,000 francs and the fitting of it up about 60,000 francs. The money for the construction and the working of the hospital has been furnished up to a certain point by private benefaction; but the State and the Municipalities have also contributed their quota. Thus, under the Financial Act of last year, a sum of 35,000 francs was voted from the Treasury, and the municipality of Copenhagen supplied 12,000 francs. The annual working expenses amount to 125,000 francs. Several savings banks, the great monastery of Vallor, as well as the Classen Trust, are donors of contributions. During the last twenty-five years the total number of scrofulous children treated has been 2750. 1222, or 52 per cent., have been completely cured; 878, or 35 per cent., have attained to a remarkable degree of health.

The Municipality of Copenhagen possesses, in addition, a small hospital for scrofulous patients at Snogebeck, in the island of Bornholm, where seventy chlldren were treated last year, this costing 10,000 francs.

The Society for Children's Hospitals in Copenhagen and its suburbs, which was formed ten years ago, now possesses an establishment at Hellebock, at which 197 children were treated in 1899. The aim of the Society is to found a sufficient number of small hospitals situate on the sea-coast, where weakly, and above all scrofulous children, shall be admitted without pay.

The Finsen Institute was founded at the initiative of Professor Nie's Rigberg Finsen, in 1896, for the purpose of making experiments, and of contributing to the progress of research on the effect of light on living organisms; above all, with the intention of utilizing the rays to the benefit of practical medicine. The Institute, the administration of which is under the presidency of M. Blagemann, manufacturer and municipal councillor, has received numerous private donations, and by the Financial Act of 1900, it has been voted a sum of 350,000 francs, as a loan without interest. The Institute is established at Rosenvaenget, in Copenhagen. The number of lupus patients that have been cured is very considerable.

A large hospital for scrofulous children at Juilsmind is in construction; the treasury has supplied 80,000 francs, and Prince Carolath has made a present of an excellent site.

As a hospital for phthisis, properly so called, there exists but one at the present time, situate on the fjord of Vejle à Fakkegrav; it was opened on March 1st, 1900, with room for 92 patients. The hospital was founded under the name of "Hospital for Consumptives," by a society, the aim of which is philanthropic. The dividend of shares being limited to 4 per cent., the subsequent profit will be employed to lessen the payments of those in straitened circumstances. The president of the administrative council is Professor Borck, Doctor of Medicine. The president of the management is M. Reisz, Councillor and Doctor of Medicine. Danish physicians have contributed a sum of 60,000 francs, and private persons 300,000 francs. The Treasury has given 150,000 francs, and for non-paying rooms a donation of 30,000 francs has been received. The Sanatorium is situated on the fjord of Vejle, and possesses forest-land 42 hectares in extent. All expenses included, the hospital has cost about 1,100,000 francs, that is to say, 12,000 francs per bed. During the ten months, March to December, 1900, 206 patients have been treated at the Sanatorium. The payment for Danish subjects per day is 10 to 11 francs for a separate room, 8 to 10 francs for a common room. To foreigners the highest fee is 5 francs daily. The hospital is under the management of Dr. Sangmann, the head of the staff.

The Municipality of Copenhagen are having a Sanatorium for Consumptives constructed in the forest of Boscrup, near Roskilde. For this purpose the Municipal Council has voted a sum of 800,000 francs. Two buildings will be constructed for the patients, one with 55 to 63 beds for men, and the other with

48 to 56 beds for women. The buildings have three stories and basements. Later on it is intended to construct a third house, which will permit of the patients being inoreased to the number of 102 to 110 men, and of 54 to 63 women. The payment will be 2 francs per day.

Up to the present day this is all that has been done in Denmark in the way of constructing sanatoria. On the part of physicians, however, much energetic work has been done in this direction. In 1898 the Association of Danish Physicians presented a petition, supported by an address signed by 200,000 of the population, to the Government and to the National Assembly, having as an object the construction of sanatoria for consumptives, as well as the founding of hospital establishments and the supply of aid to the families of patients. For this purpose they demanded the nomination of a commission, and the relief organizations in cases of sickness have, in 1900, presented an address, supported by 250,000 signatures, requesting the establishment of three State Sanatoria. On grounds of expense, the Government have not ventured to include this item on their budget.

On January 19th, 1901, at the instigation of M. Rördam, chief physician of the 1st class, and deputy; also of M. Karl Loventsen, doctor of medicine and editor of the Danish journal of hygiene, The National League to combat Tuberculosis was founded. The league was received with great enthusiasm on the part of political personages of the highest distinction, physicians, civil servants, and financiers. The minimum annual subscription is three francs, and the League now numbers 10,000 members, this giving an annual income of 100,000 francs. The Prefect of the Municipality of Copenhagen is President of the Alliance, and the President of the Chamber of Deputies, the Vice-President, the Deputy, Mr. Roerdam, are the Directors of the Committee of Operations. The aims of the Alliance are the establishment of popular sanatoria for the poor, public lectures to enlighten people as to the nature of tuberculosis, and the giving relief to the families of patients. The League is divided into twenty-five sub-sections, with local administration. In the course of the summer noted physicians, as well as political men, will hold a hundred meetings throughout the country for the purpose of giving information as to tuberculosis, and making collections for the League. The Alliance has its office at 63, Gothersgade, Copenhagen.

In 1898, there appeared, at the expense of the Treasury, a

leaflet on the nature and contagious character of tuberculosis. Of this 100,000 copies were distributed among the public. In all public establishments, as well as in many other places, information as to the nature and contagiousness of tuberculosis has been placarded about; similarly, expectorating has been forbidden on all tramways and in railway carriages.

As to precautions established by law against tuberculosis, there are very few of them in Denmark. According to the law relating to epidemics, gratuitous disinfection after cases of death due to tuberculosis is enjoined; the same law enacts that apprentices, before being admitted to manufactories, be bound to show a doctor's certificate declaring that they are in good health; and by a new law relating to labor in factories decreed last year, some regulations as to cleanliness in these establishments have been enacted. But that is all that has been done on the part of the Legislature.

The Sanitary Commission of Copenhagen, on the other hand, by a decision dated May 15th, 1901, has enacted that by public provisions pending a new order, practising physicians may have sputum examined for tubercle bacilli free of charge, in doubtful cases of phthisis. Receptacles required for the receipt and transmission of the sputum are to be had from all the pharmaceutical chemists in the city, and are delivered up for examination at the laboratory of the Sanitary Commission, 12, Norrevaldgade. The laboratories, in their turn, will send a written report on the result of the analysis to the physician concerned at the earliest possible moment.

In almost all the towns of Denmark, control over meat supply is established, but it is solely an affair of the town whether it elects to put such control in force.

In regard to tuberculosis among animals, thanks to the efforts of Professor B. Bang, Denmark occupies a position among the most advanced nations. In each year's budget there are voted on behalf of this department three or four hundred thousand francs. By means of subsidies from the State, on behalf of voluntary inspections against tuberculosis, every owner is authorized to have his live-stock disinfected; and it is ordered by law that the milk served from dairies as provender for cattle must be heated to 100° Celsius. Similarly, cattle suffering from tuberculous inflammation of the udder must be slaughtered pending compensation to the owner; and the residuum of the products of centrifugal machines must be burnt and not used as pigs' provender.

In almost all the principal towns there are private associations which are charged with controlling the wholesomeness and the price of milk.

All things considered, it appears that Denmark has not progressed badly in the battle with tuberculosis. As to the mortality caused by tuberculosis, it is diminishing in a very remarkable manner.

MORTALITY FROM PHTHISIS.

	Per thousand of those living.		Per thousand of those deceased	
	Copenhagen.	Other Towns.	Copenhagen.	Other Towns.
1870–74	3·42	2·53	143·1	131·8
1875–79	3·14	2·34	129·2	114·2
1880–84	2·89	2·24	124·0	112·6
1885–89	2·51	2·28	112·8	117·8
1890–94	2·05	2·20	99·0	105·6
1895–98	1·86	1·84	106·3	103·4

[*ABSTRACT.*]

I. TUBERCULOSIS IN BOVINE ANIMALS: ITS DANGERS, ITS PROGRESS, ITS PROPHYLAXIS.

By Ed. M. Nocard, Alfort.

CONCLUSIONS:

A.—Tuberculosis is one of the diseases of cattle which causes most loss to agriculture in all countries.

B.—Everywhere the disease is on the increase; everywhere it forms a menacing danger to public health as well as to public wealth.

C.—Infection being the only formidable cause of the increase of tuberculosis, there is need for the adoption of legal measures prescribing:—

1. *The complete separation* of unhealthy from healthy animals;

2. The slaughtering, without delay, of those sick animals which show clinical signs of the disease, and especially of cows attacked with tuberculous mastitis;

3. The interdiction from selling other tuberculous animals for a destination other than the slaughter-house;

4. The pasteurization of all the sub-products of butter and cheese manufactories.

II. ON THE RISKS INVOLVED TO MAN FROM TUBERCULOUS ANIMALS (CO-OCCUPATION, MEAT, MILK).

MEANS OF GUARDING AGAINST THEM.

Conclusions:

A.—The resemblance of tuberculosis in man and in mammals is no longer denied. Healthy cattle-sheds have been infected by lengthened occupation by consumptive cattle-men.

The converse is equally possible, at least theoretically. If it is not thought possible to prohibit cattle-men from sleeping in cattle-houses containing tuberculous cows, the least that can be done is to warn the proprietors of the risks of this practice, and of the responsibility they may eventually incur. The nightly supervision of the suspected cow-shed can be effected by means of a glass building looking on to the cattle-sheds, but having no direct communication with them.

B.—Meat obtained from tuberculous animals is rarely dangerous, and when it is dangerous it is only slightly so. The established regulations for the inspection of tuberculous meat would be sufficient to prevent even the shadow of danger, if such regulations were applied always and everywhere.

Unfortunately this is not the case.

The inspection of meat is organized only in a small number of large towns; it ought to be done everywhere, in villages as well as in towns, and it should be everywhere forbidden to sell meat not bearing the stamp showing that it has been declared to be wholesome by a competent inspector. This inspection could be easily carried out, and at little cost, on a similar plan to that adopted in Belgium for many years.

C.—The milk given by tuberculous cows is rarely dangerous, but when it is dangerous it is most often so in a very high degree; hence the necessity of submitting cow-houses to a periodical inspection when the milk yielded is destined for public consumption. Cows being really only dangerous when they have a tuberculous udder, the inspector's attention should be drawn to the state of the udder. Any cow showing clinical signs causing suspicion of the existence of a tuberculous mastitis, or of serious visceral tuberculosis ought to be isolated at once, pending the making of a diagnosis, this being easily and

rapidly done by the present process; the milk should be boiled before being sold and consumed, even by the animals on the farm. The dairyman should be obliged to give information to the inspector as soon as he has ascertained the appearance of a mastitis of any sort. When the diagnosis is confirmed, the diseased cow should be rigorously excluded from giving milk, and should be slaughtered without the least delay. Lastly, the subproducts of butter or cheese manufactories (skimmed milk, butter-milk whey, etc.) should not be delivered for the consumption of persons or animals until they have been pasteurized at the minimum temperature of 85 Centigrade.

III. Presentation of a goat attacked with experimental mastitis, and demonstration of the process of diagnosis called "harponnage."

IV. Presentation of tables demonstrating the efficacy of the procedure recommended by the author for rendering cow-houses that are most seriously infected with tuberculosis healthy, and to restore them to their original state without being obliged to buy a single animal from outside. Calves born of tuberculous cows remain healthy on the only condition of isolating them from their mothers as soon as they are born, and of feeding them by bottle with boiled milk.

[*ABSTRACT.—Section IV.*]

THE DIAGNOSIS OF TUBERCULOSIS IN LIVING ANIMALS BY SERUM-AGGLUTINATION.

By Professor Arloing, Lyons.

Since 1898, the author has been trying to discover the existence of tuberculosis in man and in animals by agglutination effected by the serum of suspected subjects (*des suspects*) and a homogeneous culture of Koch's bacillus in a glycerinated broth, *carefully selected for this purpose.*

Applied to animals of the bovine species the observations, carried out on more than 150 subjects, have demonstrated :—

1. That the blood serum of calves from five to eight weeks old does not agglutinate these cultures and does not clear them when in the strength of 50 per cent. (*i. e.*, 50 per cent. serum.)

2. That the serum of *healthy* adults agglutinates and very often clears when of 20 per cent. strength, but never completely when of 10 per cent. strength.

3. That the serum of tuberculous adults, with rather rare exceptions, agglutinates and clears completely when between

10 per cent. and 5 per cent.; and sometimes even when weaker than that.

So that every suspected animal which clears with 10 per cent. serum, a culture that would be imperfectly cleared with 20 per cent. serum from a healthy animal, may be considered as affected by tuberculosis.

4. A diagnostic injection of tuberculin (injection révélatrice de tuberculine) does not perceptibly modify the agglutinating power of healthy cattle (bovine).

5. Serum-agglutination is therefore a new method of diagnosing tuberculosis in oxen, which can be utilized under any conditions *ad hoc*, especially in cases where recourse cannot be had to the use of tuberculin.

PROF. KOCH MAKES A STATEMENT—"EXPERIMENT NOT ARGUMENT."

BERLIN, Aug. 16.—Professor Robert Koch, in a signed statement, to-day says:—

"Experiment and not argument must be the watchword of medical and scientific men who would fight consumption to the finish. I deprecate very deeply—though not from a personal standpoint, but from the standpoint of the vital issues involved—that theories, by whomsoever advanced, should now sow only greater discord in our already many-minded ranks. We are well on the road to victory over consumption. The final triumph is denied only by those who are unwilling to sacrifice their hobbies and work together to the common end.

"I have one word and only one word to say, and that is what I said in London. That word is 'experiment.' I would send it to my brother practitioners the world over. The time has passed when we may be guided either with certainty or profit by statistics. Nothing short of actual dealing with actual conditions will avail. We demonstrated that human tuberculosis was incapable of transmission to cattle.

"We have now to lend ourselves to the reverse proposition. We cannot, of course, experiment with human beings or infect them. Therefore it is necessary to keep a rigid lookout on all suspicions cases of what seems to be natural infection with cattle tuberculosis, and in this way proceed to determine if such cases really come from cattle disease or from human disease. We must continue such experiments unceasingly.

"Here in Berlin the Prussian institute for infectious disease has already made arrangement for experiments on an extensive

scale. Considerable herds of cattle have been purchased for the purpose and they will be added to as the emergency requires. It is proper to correct two mistaken impressions which have grown out of my recent London address.

"First—I laid no claim either to priority or monopoly to any ideas therein propounded. I sought only to tell of my own private experiments, and was, in fact, glad of the opportunity given to mention my contemporaries in some of their experiments, among whom was one of America's greatest medical authorities, Dr. Theobald Smith.

"Second—I did not mean to recommend the abandonment of comprehensive and expensive systems of regulation, prevention and inspection that are now in operation. I simply said that it was injurious and unnecessary to go further with such systems when we were justified in expecting that our long sought remedy was found and almost within our reach. Why, then, should we rear higher structures which must inevitably fall to the ground?"

KOCH'S TUBERCULOSIS CONCLUSIONS.

SPECIMEN COMMENTS OF THE MEDICAL AND AGRICULTURAL PRESS.

REVIEW BY THE "NEW YORK MEDICAL JOURNAL."

Several years ago Robert Koch startled the world by announcing that in tuberculin he had found practically a remedy for incipient tuberculous disease. At that time he had already achieved great distinction as a bacteriologist, and physicians everywhere, relying implicitly on his expressed convictions, vied with each other in obtaining and promptly employing the product, but it soon appeared evident that it was of no considerable curative efficiency save in the particular form of tuberculous disease known as lupus. Enthusiasm did not rise so high over his more recent *tuberculinum residuum* (T. R.), and now we hear little about it. It is no wonder, then, in view of the virtual failure of tuberculin, that when, before the recent British Congress of Tuberculosis, Koch belittled the precautions generally taken at the present day against the spread of tuberculous disease from cattle to man, there was a very general dissent from his views. It will, we think, take more than a few experiments, coupled with rather sweeping deductions from common observation, to demonstrate to the medical profession

that the supposed fact by which those precautions are warranted is no fact at all, for that is what Koch's contention will generally be interpreted as amounting to.

Professor Koch seems to have convinced himself that cattle are nearly, if not quite, insusceptible to infection with the micro-organism that occasions tuberculous disease in human beings. His experiments, not many in number, but extending over a considerable period of time and persistently and systematically carried on, it must be admitted, have failed to convey the human disease to cattle, whether they consisted in feeding them with tuberculous sputum, in implanting it in a serous cavity, or in injecting it beneath the skin, whereas the same forms of inoculation with tuberculous material of bovine origin promptly resulted in infecting the animals with tuberculous disease. Great weight should undoubtedly be accorded to these experiments and to any opinion expressed by so acute an observer as Professor Koch, but in our opinion they cannot be held to be decisive by themselves alone. Opposed as they are to almost universal conviction, they cannot be accepted offhand as final. Further experiments, varied perhaps in some ways that have not occurred to Professor Koch and that possibly will not at once suggest themselves to the minds of others, will have to be made before the question of the transmissibility of human tuberculous disease to cattle can be regarded as quite settled. Perhaps there are few qualified observers who would at the present time declare without reserve that "tuberculosis of man and cattle is identical," as the United States Veterinary Medical Association did by resolution in 1896, but at least they are so nearly identical that each is capable of yielding a product known as tuberculin, and surely that is a dangerous approach to identity.

Furthermore—and this is a far more momentous matter for the human race—Koch argues against the transmissibility of bovine tuberculous disease to man. Deliberate experiments to decide this point are of course out of the question, but Koch thinks that the world is unconsciously performing experiments that suffice to sustain his view; that is to say, that beef, milk, and butter contaminated with living tubercle bacilli are constantly being ingested by many human beings, and yet primary tuberculous disease of the digestive tract is rare. To argue from such observations that the disease is not transmissible from cattle to man seems to us rather inconclusive. Theoretically, it may be granted, a tuberculous process at the initial

point of contact of the germ with receptive tissue should be set up before an invasion of other parts took place, but we cannot regard it as proved that such is always the case. Who can say that in every instance of tuberculous disease of the meninges, of a joint or of any other structure not directly exposed to contact with germs a local tuberculous process is first set up at the point of their original lodgment. Reasoning from analogy, we may refer to M. Jullien's article, entitled "Two Clear Cases of Syphilis without a Chancre," published in the *Medical Press* for July 3d and abstracted in this issue of the *Journal* under the head of "Miscellany."

Finally, let us consider the action of tuberculin. Are we to take it for granted that all the tuberculin that is capable of giving rise to the diagnostic reaction in cattle is of bovine origin? Apparently, that would have to be the case if human tuberculous infection were not transmissible to cattle. If it is the case, Koch's deductions will receive support in a substantial form, though it must still be borne in mind that, as a rule, infectious diseases which affect both man and the lower animals are not so readily transmitted from the one to the other as they are from one individual to another of the same species. All things considered, we must still urge upon sanitary officials the folly of discontinuing the precautions now resorted to until the needlessness of them is much more clearly shown than it has been thus far. As subjects of thought and further investigation, Professor Koch's propositions are quite in order, but that, it seems to us, is all that can be said of them at present. Even if they ultimately turn out to be well founded, the interests of stock-breeders and dairy-farmers will still require the extermination of tuberculous cattle.

FROM THE "BREEDER'S GAZETTE."

The katabasis has come. For years the noble army of tuberculine squirt-gun manipulators has been marching up the hill, beating tom-toms and brandishing the pole-axe, crying, "Kill, Kill." This fierce and bloodthirsty campaign against our herds has been waged on the disputed assumption that tuberculosis in cattle is a menace to the public health. Broadly and yet accurately speaking it has been based on the discoveries and the declarations of Dr. Robert Koch, the eminent German bacteriologist, who at first believed he had found in tuberculin a cure for consumption. Servile worshippers of asserted authority, the half-baked scientists and zealots of the squirt-gun brigade have

pushed their work of destruction until it has mounted to millions of dollars, despite the protests of scientists of high standing who denied the alleged danger. This was the anabasis—the going up against the husbandmen of the world whose herds furnish milk and meat for the sustenance of the people.

But the katabasis has come. The going down has begun. In London last week before the scientists of the world assembled at the British Congress on Tuberculosis Koch recanted. He had previously affirmed the transmissibility of tuberculosis to man from the meat and milk of animals. After a decade of investigation he now declares with unqualified positiveness that "*human tuberculosis aud bovine tuberculosis are radically different diseases.*" He declares that he has absolutely demonstrated that cattle cannot be infected with human tuberculosis and that he has satisfied himself that it is impossible for bovine tuberculosis to be transmitted to man. The danger of infection from milk he considered "so slight as to be unworthy of precautionary measures"!

Now watch the noble army of matadors march down the hill. But not with its banners of death's-head and cross-bones flying in the breeze; squirt-guns and pole-axes will be carried at "reverse arms." The man who first furnished inspiration and weapon has spiked its guns and it will fall back in a rout.

It should be remembered that Koch's London declaration is a recantation, a reversal of view, a signal surrender to stubborn facts discovered in years of investigation. But there are many scientists who have long held this clear vision. They have been in the minority, it is true, because the crowd blindly follows constituted authority. The theory of the transmissibility of tuberculosis through milk and meat has been held as "not proved" by many and has been vehemently disputed by some, armed with the facts of human experience and scientific investigation. Now that the acknowledged great authority on tuberculosis has cast aside his first-held views and joined the minority, a New York physician is doubtless correct in saying that "the enlightened minority of the medical profession, which has maintained that tuberculosis cannot be contracted from animal substances, will speedily become a majority of the profession."

But even assuming that some extremists, with the bigotry that holds to a preconceived opinion in the face of new and convincing evidence, try to continue the scare against milk and meat, in what position do the matadors find themselves? Simply this: standing on disputed ground, with the most emi-

nent authority on tuberculosis in the world squarely antagonistic to their theory, they wage murderous warfare on the herds of of the husbandman. It is against this outrage that *The Gazette* has persistently protested. It raises no objection to a study of this disease at public expense; it has stoutly opposed the experimentation on private property which has characterized the tuberculin crusade and has demanded that it cease until more light is shed on the subject.

Now a great light has shined. Truly enough "the sanitary systems of the world have been shaken to the very roots. The word revolution but faintly expresses what the discovery will precipitate." The supposed menace to public health from tuberculous cattle is wholly eliminated by Dr. Koch. The question then becomes merely an economic one, concerning only the breeders and owners of cattle. If a man believes he has the disease in his herd he can use the tuberculin test if he wishes. Valuable breeding animals that may react can be isolated and bred from. Sanitary conditions can be instituted, for in the language of a French scientist at the London congress, "a sanitary house is anti-tubercular."

But the reign of the pole-axe in the hands of the public official is doomed.

DEPARTMENT OF SURGERY.

By L. A. and E. Merillat.

Chicago Veterinary College, 2537–39 State Street, Chicago, Ill.

SURGERY OF THE EYE, EAR AND UPPER AIR PASSAGES.

(*Concluded.*)

4. *Periotomy* is the resection of a part of the conjunctiva around the cornea Although it is an operation that is seldom attempted, it is a procedure that should be selected when no other surgical interference or palliative treatment will improve the existing condition, which may be considered an indication for the operation. In veterinary practice we would not recommend the operation, excepting when no other treatment can be used instead, and when unsatisfactory results would not lessen the usefulness of the patient. Undesirable sequelæ common to the operation cannot be obviated in animals as in man, even if the greatest care is taken to do the operation aseptically; the danger of subsequent infection is much greater than in human

patients, because animals do not protect themselves against secondary infection, which is favored in lower animals by their environment; but, even with such unfavorable conditions, there are instances when the operation is indicated and the results from the procedure are sometimes very good.

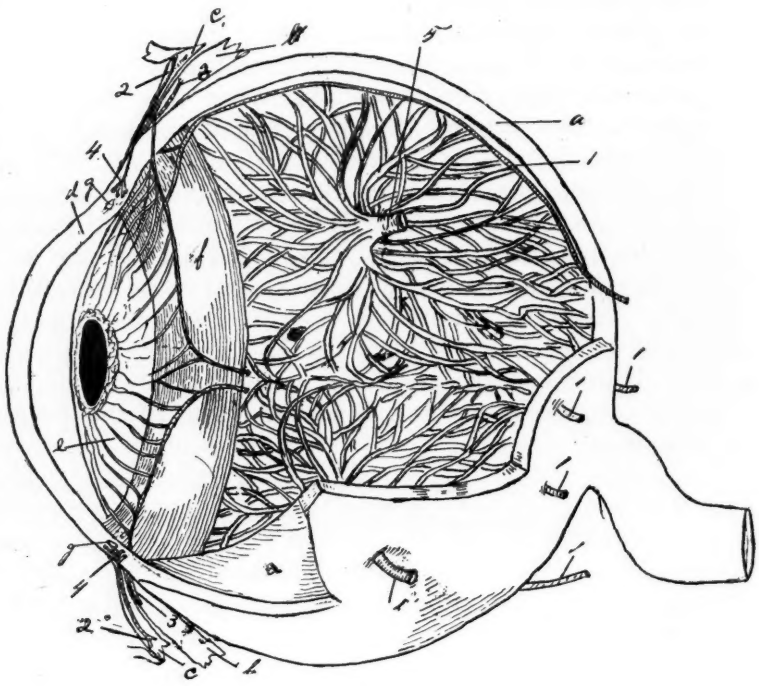


FIG. 57.
CIRCULATION OF THE EYE.

a, sclera; *b*, straight muscles; *c*, conjunctiva; *d*, cornea; *e*, iris; *f*, ciliary muscles; *g*, canal of Schlemm; 1, posterior ciliary arteries; 2, anterior and posterior conjunctival arteries; 3, anterior ciliary arteries; 4, Sclero-corneal plexus (capillary); 5, venæ vorticosæ.

Indications.—Any vascular condition of the cornea that cannot be improved otherwise is an indication for the operation; but, we must not treat all vascular corneæ by such intervention, for there are many of these cases that will yield to other treatment. Vascularization of the cornea may be a sequel of trachoma, entropion, trachiasis, or, result from hypernutrition. When the vascularity occurs as a sequel of entropion or trachiasis, it is usually lessened by the removal of the cause; especially,

when this is done in the early stage of either of these conditions; and, when it is a secondary condition, it is usually confined to the superficial layers of the cornea (*pannus tenuis*); but if due to a trachomatous condition it generally invades the proper substance of the cornea (REVIEW, *Vol. XXV., No. 3, p. 208*), and in such cases the layers involved become very thick (*pannus crassus*), sometimes involving the entire cornea, which becomes so thick that the iris cannot be seen. If the pannus is the result of a trachomatous process, it seldom terminates without ulceration; but if due to hypernutrition, the newly formed blood vessels in the connective tissue are sometimes obliterated by absorption. As pannus is generally a secondary condition, the treatment necessarily must be directed to the primary cause; and that removed, either by surgical means or otherwise; but when the vascularity remains after the cause is removed, then the treatment must be direct to the condition itself.

The treatment adopted in such cases, should be either one of the following:

(*a*) A reduction of the blood supply to the newly formed tissue, or:

(*b*) Increased absorption of newly formed tissues.

The latter (*b*) is generally not very successful, although various methods have been recommended for this purpose; such as infusions that will cause inflammation of the conjunctiva; or, the insufflation of powdered remedies to cause inflammation and increase absorption; these methods of treatment, however, have never given very good satisfaction, but are the only substitutes for surgical intervention.

Most cases of pannus, when allowed to run their course without treatment, terminate in ulceration of the cornea (*suppurative keratitis*), especially in severe extensive vascularity; therefore, when the condition is such that the indications point to such an unfavorable termination, the only course of treatment to select is surgical intervention which will reduce the blood supply to the cornea.

There are several methods of operating for vascularity of the cornea, and we shall mention one besides the operation in question (*peritomy*) which has been considered a good substitute for periotomy. The procedure was introduced into the list of ocular operations by Kenneth Scott, and according to his method of operating for vascularity, the blood vessels are cut one by one until all have been divided. In order to accomplish this, it is necessary to use a magnifying glass; for without the

use of the glass, the smallest vessels cannot be seen and are therefore overlooked. The instrument necessary for the operation is a Graefe knife.

Operation.—The instruments used in periotomy are an eye-speculum, a sharp-pointed knife, small scissors and a small pair of dissecting or fixation forceps. The instruments and all other articles, such as sponges and bandages, must be well sterilized and the operation performed aseptically. The procedure, though comparatively simple, is a tedious one. A narrow band of the conjunctiva is dissected out from around the cornea and all the blood vessels going to it are resected; the strip removed may vary in width from 3 to 4 mm. Heretofore, the greatest annoyance during the operation was the hæmorrhage, but now, since the efficiency the extract of supra-renal capsules as a local hæmostatic has been ascertained, hæmorrhage is not such a disturbing factor. The blood supply to the seat of the operation is from the anterior and posterior conjunctival arteries (*Fig. 57–2*), which form a plexus around the cornea (*Fig. 57–4*); these arteries anastomose with the anterior ciliary (*3*) and posterior ciliary arteries (*1*) in the scleral conjunctiva (*c*), which gives it very abundant blood supply. The hæmostatic may be applied as a subconjunctival injection before the operation is begun, which will make the conjunctiva bloodless. Another method of applying the hæmostatic is, to make the peripheral incision and treat it with the hæmostatic before the inner incision is made and the strip of conjunctiva is removed; this also enables the surgeon to do a bloodless operation. The patient must be cast or placed upon an operating table, a general anæsthetic administered, and then, if cast, placed in the most convenient position that will enable the operator to work without being hindered in any manner; when this is accomplished, the eyelids are retracted by the adjustment of the speculum; the eyeball is fixed with the thumb and forefinger of the left hand, and with a small sharp-pointed knife, two incisions are made around the cornea about 3 or 4 mm. apart, and the conjunctiva between the incisions dissected out with a sharp knife and dissecting forceps. The part dissected out should not be more than 3 mm. (⅛ inch) in width; if the space between the two circular incisions is made too wide, it leaves a large cicatrix, which is always very noticeable, but if made very narrow, it leaves only a small mark in the conjunctiva, which is scarcely perceptible; and obliterates all vessels going to the cornea as well as when a wide strip is removed.

After-Treatment.—After the operation, the eye should be covered with cloths wrung out of ice water to prevent inflammation; or a compress securely adjusted to the eye, and ice water from a fountain syringe allowed to trickle upon it for the first twenty-four hours. The compress should then be removed, and washed well with a weak solution of boric acid, or a normal salt solution made with sterilized water; after which, another compress must be applied to the eye, saturated with either of the above solutions, and hood adjusted (REV., *XXV, No. 3, p. 213, Fig. 51*). This last dressing must be renewed every day, the eye thoroughly washed and examined for adhesions of the ocular and palpebral conjunctivæ.

SURGICAL ITEMS.

Removal of the (scent) Gland from a Specimen of Mephitis Mephitaca (common skunk).—A short time ago a gentleman of sporting proclivity asked me if I would remove the scent gland from a skunk for him, and remembering that I had read of the operation having been done by my friend and preceptor, Professor J. M. Wright, of Chicago Veterinary College, I told the gentleman that it could be done. When the skunk arrived I tried in vain to find Professor Wright's article, but that copy of the REVIEW had eluded me, so I proceeded in the following manner: Rolled the animal in a blanket and anæsthetized him with ether, washed the anus and adjacent parts with creolin solution and distended the rectum with the finger and made a small incision over the gland, grasped it with forceps and enucleated it; the same on the other side; washed the parts again with creolin solution and let him revive. The second day the little fellow was a trifle dull and I washed out the rectum with a solution of magnesium sulphate, and from then on he made an uneventful recovery. I wish to say that two medical gentlemen volunteered to assist me, which they did from the opposite side of the street.—(*W. L. West, Belfast, Me.*) The article referred to by Dr. West is a "surgical item" found in Vol. XXIV, p. 444, of the REVIEW (Sept. number, 1900).—(*E. M.*)

Mesoneurectomy and Some of its Sequels.—It is now about five years since mesoneurectomy has become a standard operation in the United States. Unlike double tibio-peroneal neurectomy, which is at times a tedious operation, at least the peroneal part of it, mesoneurectomy is easily performed and an exceedingly valuable and safe operation. It is not the writer's desire to discuss anatomical landmarks; suffice it to say that along

that line—the site of incision—is indirectly responsible for the frequency of nerve tumors which some report. The writer has performed 124 mesoneurectomies and resected three fibroneuromata three years ago; since that time no more nerve tumors have been observed, because the orthodox site of incision has been changed—a point to be discussed another time. From time to time reports have appeared in the current literature in regard to mesoneurectomy, nearly all of which covered a limited number of cases and simply represented a corroboration of the data contained in Liautard's translation, which induced the bulk of the American operators to try this form of neurectomy. There are two sequels which the writer has observed from time to time and which to his knowledge have not been reported. The one is a partial paralysis of the radial nerve, the other an intense degree of itching on the internal aspect of the operated leg below the fetlock. 1. Partial paralysis of the radial nerve. In my work on the "Clinical Diagnosis of Lameness in the Horse," under the head of "Paralysis of the Radial Nerve," on page 44, the diagnosis and differential diagnosis given there correspond exactly with the symptoms which are about to be described and which were observed in five cases of mesoneurectomy: *Case 1.*—The first horse the writer ever mesoneurectomized. Topical anæsthesia with 10 per cent. cocaine. The animal behaved nicely and 15 minutes were probably consumed in throwing him and performing the operation. As soon as the animal regained its feet there was total inability to support weight upon the operated leg. As soon as the leg was extended by hand he stands squarely upon it, to knuckle over and break down when the slightest shock is experienced by the toe. No treatment save rest and close attention to the wound was ordered; this paretic state persisted more or less for three days, when it disappeared permanently. My feelings when the horse got up also were of a paralyzing nature. The olecranon muscles appeared flat and flabby and the peculiar forward jerk of the scapula so characteristic of this lameness was well marked. *Case 2.*—Was chloroformed; same symptoms, but less marked; had good use of his leg 24 hours later. *Case 3.*—Was chloroformed; same symptoms. The paretic state of a mild degree persisted for 10 days. *Case 4.*—Was cocained; same symptoms; was neurectomized in both fore legs at the same time, as the writer often does. The horse after the operation hopped into its stall on the hind legs only, like a kangaroo; he went to work in the third week. *Case 5.*—Was chloroformed; same symptoms, but

very aggravated; 4 weeks passed before the animal regained full control over the paretic leg. *Pruritus.*—To judge by the action of the animal there seems to be an agonizing itching right below the fetlock on the internal aspect of the operated leg. The creature persistently gnaws the parts until a large raw surface is created, which by no means causes him to discontinue his gnawing. When means of restraint are employed to prevent the chewing he will paw more or less with the operated leg. The writer has observed three such cases. The itching in these three instances set in about three to four weeks after the operation and persisted for about one week to ten days, at the end of which time no further trouble was experienced.—(*W. E. A. Wyman, Milwaukee, Wis.*)

"*The Technique of Bloodless Work*".—In the August number of the *New York State Journal of Medicine* we find an article with the above title, by Robert H. M. Dawburn, M. D., which begins by stating that: "The older the surgeon, the greater becomes his respect for a drop of blood. All cutting operations on the extremities should be bloodless ones, and all elsewhere as near as possible. Every drop of blood saved is a safeguard against shock; and bloodless work permits the same speed and facility of dissection that one could employ on the dead body." To all that is mentioned in the above text, we may add that the presence of blood in an incision acts as foreign material and prevents union by first intention; this is one of the reasons why surgical wounds of large domestic animals do not heal as readily as those of small ones or even man.

No veterinary surgeon has yet been able to make the removal of shoe-boils or large tumors, a bloodless operation; in fact, besides the neurectomies and tendonotomies of the extremities, we have but a few bloodless operations in the surgery of the horse. Exsanguination of the extremities by the use of the Esmarch bandage has given very good satisfaction, but where it cannot be applied, we have no method of arresting capillary hæmorrhage, which is much greater in the horse than in the human patient. Arterial hæmorrhage can be controlled by ligation or torsion; but the capillary oozing from the walls of the incision cannot be arrested but by the actual cautery or strong astringents that will destroy the tissues and encourage sloughing, which impedes granulations or union of parts. What is most needed in surgical operations that require deep incisions, is some hæmostatic that will cause local anæmia without injury to the tissues. We believe that this will be accomplished be-

fore long, either by therapeutic agents, such as extract of suprarenal capsules, moderate application of heat, such as electrothermic hæmostasis, or extraction of heat from the parts by liquid air or other refrigerants.—(*E. M.*)

Professor Koch's Conclusion, as to the transmission of bovine tuberculosis to man, is of no surgical value; but, the "Surgical Department" of the REVIEW recognizes its importance to the veterinary profession and live stock interests in general. There has been nothing new but this conclusion placed before the medical and veterinary profession during the past decade to excite enthusiasm in the discussion of the disease, and to encourage experiments on the line of transmission. He has aroused everybody from their lethargy, and beseeched them to obtain and countenance the truth. If the dairy products of a tubercular herd are not injurious to man, everybody should know it; if the meat of tubercular meat-producing animals is fit for food, it should be known generally, and to a certainty, and thereby save the thousands of dollars that are sacrificed each year for prophylactic measures; but, on the other hand, if the experiments that are likely to follow in verifying this proposition are well directed and carefully made by every progressive nation or government respectively and prove that the preventive measures that have been in vogue during the past have not been a waste of professional and scientific energy, they will serve to convince those who have heretofore been indifferent or skeptical about the transmission of the disease, that they have done themselves and humanity an injury by their attitude. Such a conclusion emanating from any one but he who opened up the avenue to the micro-biology of the disease, could not have awakened so much anxiety among the chauvanistic, disinterested, indifferent and skeptical; and, we believe that the stand he has taken will be a benefit to all concerned, "be it as it will."—(*E. M.*)

EXTRACTS FROM EXCHANGES.

GERMAN REVIEW.

By ADOLPH EICHHORN, D.V.S., Bureau of Animal Industry, Milwaukee, Wis.

TO THE TREATMENT OF NYMPHOMANIA AND BARRENNESS IN CATTLE [*Servatius*].—Nymphomania and barrenness in

cows is often disagreeable to the owners, and it occasionally may cause great loss to them. A treatment, accompanied with good results, therefore, would be very much welcomed. The author succeeded in 80 to 90 per cent. of cases, to allay the diseased condition, and of the cured in about 30 per cent. to bring on the regular period of œstrum. The treatment consists of crushing the cysts in the ovaries, by the way of the rectum, which almost in every case are the causes of nymphomania. After the operation the symptoms disappear in a short time. The hollowing on the sides of the first coccygeal vertebræ, which is considered almost as a pathognomonic symptom of nymphomania, will disappear as a rule, in the course of a few days, as the dropped broad ligaments of the pelvis will regain their normal position. The ceasing of œstrum in some cases may be due to the insufficient transformation of the corpora lutea. Those also can be determined by a rectal examination and squeezed out, after which procedure the period of œstrum will often reappear.—(*Mittheilung d. Ver. bad. Thierärzt.*)

To the Treatment of Lung Tuberculosis with Tuberculin [*Dr. Goetch, with a Postscript of Prof. R. Koch*].—In cases of tuberculosis which were not considered as mixed infections with suppuration, the tuberculin treatment was applied by G. The diagnosis of tuberculosis he establishes in the patient, by the presence of tubercle bacilli in the sputum, or by the suspicion from the constitutional and physical condition of the body, and by the response of the tuberculin test, with an elevation of the temperature. By gradually increasing the dose in such a manner that a new increase is not undertaken before the last injection expires without a reaction, the patient stands a dose of 1 gm. of tuberculin, which then completes the cure. The bacilli and cough will disappear, and an increase in the bodily weight will be observed. To these interesting observations Koch adds the remarks, that the unfavorable results with tuberculin are often to be traced back to the cause, that it has been applied in cases which were not pure tuberculosis, but complications with suppurative processes. In the early states of tuberculosis which are not too far advanced in nonfebrile lung tuberculosis, the tuberculin treatment was effective in every case. One must avoid a strong reaction. Dr. Goetch, as much as possible, avoided reactions, and finally arrived to very high doses. From these astonishing good results of the author, Koch personally convinced himself in the Slawentzitz sick house.—(*Deutsche Medec. Wochenschr.*)

CONTRIBUTION TO THE TREATMENT OF HÆMOGLOBINURIA [*Kas*].—K. applied in 16 cases of hæmoglobinuria in a horse, the bromide of potassium treatment as recommended by Metzger, obtaining 15 complete recoveries, most of which were over the effects on the second or third day, and at latest on the fifth. K. administered 70 to 75 gm. of the bromide of potassium in 400-500 gm. of water, which dose in severe cases was repeated on the second day. The animals were also bled and an eserin injection (1.5 gr.) was given. Outside of these friction was applied to the hind-quarters with spirits of camphor. At the same time artificial evacuation of the rectum and bladder was resorted to through salines and aloes.—(*Thierarzt. Centralblatt.*)

HOOF OPERATION IN AN ELEPHANT UNDER THE INFLUENCE OF MORPHINE ANÆSTHESIA [*Frick*].—In the zoological garden, at Hanover, an elephant's hoof proved to be affected by an abnormal growth of the horn. Due to deficient wearing the horn on the hind legs grew out very long, which rolled up in a spiral way. By this the skin became affected right over the horny part, and on the left hind leg, there was a 15 cm. long and 4 cm. wide defect of the skin, which profusely suppurated and was filled with flabby granulations. Years before that, the elephant was placed in stocks and was operated upon, but on this occasion he became suspicious and would not enter the stocks. Therefore all that was left to be done was to place the animal under anæsthesia. Frick decided on the administration of morphine by the mouth, of which 40.0 gm. in a liter of rum and a liter of water with the addition of 7.5 gm. sugar was to be given. If this would prove insufficient doses of 5.0 gm. of morphine were to be repeated. On March 12th at 8 A. M. the mentioned dose was given, which the animal drank voluntarily; at 9 another dose of 10.0 was placed before the animal in rum, but of which only ¾ gm. of morphine was taken in. At 11.15 A. M. the elephant suddenly fell down, and in the beginning made efforts to rise, but without success. Gradually the struggling with the legs ceased, so that at 12.15 the animal was completely anæsthetized.—(*Deutsch. Thierarzt. Wochensch.*)

ENGLISH REVIEW.

By PROF. A. LIAUTARD, M. D., V. M.

AZOTURIA WITH UNUSUAL PREMONITORY SYMPTOMS [*By E. W. Hoare, M. R. C. V. S.*].—Under this heading the author

relates the case of a mare in which the first manifestations of the trouble were only that the near hind leg was unable to carry any weight, with which the animal when standing was constantly striking the toe on the ground in a convulsive manner; if forced to stand the mare would knuckle over on the fetlock. There was on the inside of the femoral region a soft circumscribed swelling, hot and painful, and below this the leg was cold and almost without sensation. The urine was of a deep yellow color, thicker than normal and highly ammoniacal. The off hind leg was taken in the same way the next day. The urine remained in the same condition and only became a little deeper in color towards the end of the disease. The animal died. The history of the case was not given to the author until the second day of his attendance. The treatment consisted in the administration of chlorodyne, purgatives, diaphoretics and cannabis indica to control the convulsive spasms of the animal. This last was rather satisfactory.—(*Vet. Record.*)

SUCCESSFUL TENOTOMY AFTER MEDIAN NEURECTOMY [*By E. Langford*].—This form of neurotomy is certainly gaining great notoriety in veterinary surgery, and it may not be surprising if a day will not come when it will lose the value of its merits, by the fact that it has been abused, and, like plantar neurotomy, applied even in cases where it was least needed. At any rate, this case is that of a cart horse, suffering with acute lameness due to a contracted and painful condition of the perforatus tendon. The animal knuckled considerably. Firing, blistering, and long rest failing to relieve, median neurectomy was resorted to. It also failed. The author then decided to perform tenotomy; he divided the perforans and perforatus tendons, and also cut the artery. The wound, however, healed well, and after a while the horse went to work. It does not knuckle any more either.—(*Vet. Record.*)

LUXATION OF THE TIBIA AND ASTRAGALUS [*By A. L. Farrant*].—This is an uncommon case, which the author records because he has not found such a case recorded except once by a French author, who stated that he had obtained a successful reduction. Mr. Farrant has been less fortunate; he had to destroy his patient. A well-bred mare bolted, and in turning a corner collided with a truck with such tremendous force that the hind legs spread laterally, whilst the body fell upon the near side, and the tibio-tarsal joint was completely dislocated. The animal struggled to its feet, however, and when standing the leg hung from the hock in a pendulous manner—

the tibia being entirely out of the pulley grooves of the astragalus and was pointing inwards. The internal, lateral, anterior and posterior ligaments were torn and the skin lacerated. There was but little hæmorrhage.—(*Vet. Record.*)

VOLVULUS OF THE COLON [*By E. W. Hoare*].—The correct diagnosis of the nature of colics is sometimes so difficult that any case has its interest and value, and even old practitioners are surprised at the lesions that they find at post-mortems of cases which they have lost. We certainly think it was the case with the author when after treating an animal for colic with more or less severe manifestations he discovered at the autopsy that he had had to deal with a case in which the first and second divisions of the colon were twisted and required to be turned three times before the twist was got rid of. Of course the intestines were acutely inflamed at the anterior portion of the twist; the blood vessels were enormously distended. There was a small rupture of the most acutely inflamed portion of the intestines also.—(*Vet. Record.*)

EMBOLIC LAMENESS [*By W. H.*].—After a few remarks upon the facility of making diagnoses in cases of lameness due to embolism the author points out the fact that there are cases where it is, on the contrary, somewhat difficult to come to a conclusion as to the true cause of the trouble. He then relates three cases of embolism where the symptoms presented different aspects. In the first, a mare, which had always worked well, was suddenly taken with lameness forward while at work. She was brought home on a float, grew worse, and the next day her symptoms were so aggravated that she was destroyed. Post-mortem: Embolism of the axillary artery, which was filled by a clot several inches long. In the second case a gelding showed the ordinary symptoms of lamenese of one hind leg, which occurred with work and subsided by rest, and in which embolism of one of the iliac arteries was readily made out by rectal examination. In the third case the symptoms were altogether of an abdominal nature, and rectal examination revealed embolism of both iliacs extending forward into the aorta. In conclusion the author says: "These observations suggest that the first attack is always the most violent one; that after attacks are less serious, unless the horse is forced to keep moving; that colicy pains occur only when the clot extends forward from the iliac to the aorta."—(*Vet. Record.*)

AN ENORMOUS SARCOMA [*By Walter Parkman*].—A seven-year-old horse had been slowly losing flesh, which was sup-

posed to be due to overwork. He was turned out for a month, during which time he had one or two slight attacks of colic, and after six weeks was returned to light work in a much improved condition. After a short time, however, he began to lose flesh again, and as his condition seemed to grow rapidly worse, he was destroyed. On making a post-mortem a large mass was found surrounding both kidneys and firmly adhering to the back and to the ribs. The whole mass was carefully removed with both kidneys intact, and when placed on the scales was found to weigh *one hundred and twenty-five pounds.* The mass was formed of solid, firm tissue, which was of the nature of round-celled sarcoma with the microscope made by Prof. McFadyean. This was evidently a unique case and a unique weight for a sarcomatous growth to attain and give rise to so little disturbance beyond the wasting of the body referred to.—(*Vet. Record.*)

ITALIAN REVIEW.

By Prof A. Liautard, M. D., V. M.

Suppuration in the Guttural Pouches, with Ulceration of the Membrana Tympani [*By Dr. Durante Luca*].—This case is undoubtedly very unusual. It relates to a horse which was brought to the clinics of the Veterinary School of Pisa, and which presented all the symptoms of suppurative collection in one of the guttural pouches, that of the right side. There was a swelling in the parotid region accompanied with muco-purulent discharge from the nostrils, but more from the right. When the animal would carry his head low down the discharge would increase, and become more grumelous. And, besides this, it also offered the peculiarity that the discharge would then also appear running from the right ear; and on that account the skin was more or less soiled with dry crusts of suppuration. A simple treatment of antiseptic irrigations was prescribed, and after a certain time it was found that the trouble of the ear had entirely disappeared, while that of the guttural pouch remained about the same. Surgical interference was decided upon. At first it was tried to wash the pouch by pushing fluid through the catheter of Gunther, but as this did not work, hyovertebrotomy (cistigutturotomy) was performed as follows: By an incision superiorly and inferior in the centre of the triangle of Viborg. A

drain-tube was introduced, by which the cavity could be washed and ridden of a caseous hard mass which was contained in the sac. When the discharge had entirely ceased and the drain-tube removed, a blister was applied to absorb the thickening remaining. The most interesting part of this case is the presence and escape of pus through the right ear, which indicates that the suppuration must have found its way through the Eustachian tube into the middle ear and provoked the ulceration of the membrana tympani.—(*Il Nuovo Ercolani.*)

LARYNGOTOMY FOR MALIGNANT TUMOR IN A DOG [*By Dr. Carlo Parascandolo, Prof. at the R. University of Naples*]. —Benignant as well as malignant tumors in the larynx of our domestic animals have been recorded by Lanzillotti, Mecke, Scruby, Degivé, Weber, Fleming, Gwilt, and others. The former can be removed per mouth sometimes, and again through opening of the larynx, when by simple excision, the ecraseur or cauterization their extraction can be completed. In this case the author had to deal with an epithelioma, characterized by a marked swelling as big as a small nut, with thickening of the whole larynx, which in being explored with a rubber tube was found the seat of a foreign body. The dog had a hoarse bark, coughed frequently, with labored breathing, difficult deglutition, and sensitiveness to pressure of the throat. The breath was fœtid, the saliva, of bad odor, was mixed with blood. Examination with the laryngoscope revealed a neoplasm of the larynx with an ulceration as large as a ten cent piece localized at one point, but with the laryngeal mucous membrane highly inflamed. The temperature of the animal was normal. The only indication possible was the removal of the larynx. After careful measures of general antisepsy practised for several days, the animal having received subcutaneous injections of chloral and morphine, and separation being made of the crico-tracheal ligament, a tracheotomy tube similar to the one used in the operation for roaring was introduced in the trachea, and the larynx having been exposed, the extrinsic muscles were separated from their attachment on the hyoid bone and the cartilages, and when the whole cartilaginous frame was isolated it was drawn through the cutaneous incision and its section completed. The floor of the pharynx was closed by stitches uniting the muscles of each side, and the stump of the trachea being secured with stitches to the skin, a tracheotomy tube was introduced, to be removed and cleaned every day. The animal was kept fasting for two days after the operation, then fed by

rectum for three days, afterwards with eggs and broth, and finally with solid food. The animal, a year after the operation, was in perfect health and there was no sign of return of the disease.—(*Il Moderno Zooiatro.*)

CERVICAL TORSION IN A MARE CURED WITH DEEP CAUTERIZATION [*By R. Carozzo*].—On September 15, 1899, the author was called to visit a mare which had been cast one night with one leg caught in the rope of the halter. She was found in the morning panting, with the body covered with perspiration, and having extensive bruises and lacerations of the external face of the left knee, of the right elbow and of the left thigh. The animal was raised and placed in slings. The various wounds were treated according to their nature, those of the knee being so extensive that gangrene had set in and the tendon of the lateral extensor of the phalanges was exposed. From the first day a swelling had been observed on the left side of the neck, which was treated by local astringent applications. Notwithstanding this, the swelling continued to increase and the neck soon began to be bent to the right, stiff, with the head carried close to the ground, and without possibility to straighten it or to even temporarily bring it back to its normal direction. The deviation was such that the animal was unable to trot, and if made to move would fall heavily on the ground. In the presence of such condition the operation recommended by Prof. Lanzillotti for such affection was recommended, but objected to by the owner, who afterwards, having waited two months for a natural recovery without obtaining any improvement, left it to the author to do what he thought best. He then resorted to actual cauterization. The animal was thrown on the right side and firing applied on the left convexity with fifteen points of iron applied two or three centimetres apart. The iron was introduced deeply down to the transverse processes of the vertebræ and applied two or three times in each point. About one month after the cauterization the deviation of the neck began to diminish, and after three months recovery was complete, the neck having resumed its normal position and regained its natural flexibility.—(*Clinica Veterin.*)

NEOPLASM OF THE RUMEN [*By Dr. Bruno Scotti*].—A steer of nine years had been suffering for some time with tympany, and of late, notwithstanding the use of all kinds of treatment, had resisted all of them and was always tympanitic. His appetite was very capricious, rumination was gone and he was losing flesh rapidly. Attempts were made to find out if there was some

foreign body in the œsophagus. These were negative except that in one instance the probang which was used was tinged with blood and covered with fragments of tissue. Failing in making a diagnosis and the animal being yet in fair condition he was destroyed for the butchery. When he was opened an examination was made of the abdominal organs; a great number of papillomatous growths were found at the extremity of the œsophagus and extending over the entire surface of the inferior wall of the rumen. These tumors had quite a wide base, of soft consistency and without ulcerations, except on those which had been injured during the catheterism.—(*Il Nuovo Ercolani.*)

CYST OF ECHINOCOCCI IN THE HEART [*By Dr. Bruno Scotti*].—A steer which had been turned out in liberty fell down suddenly and died. The post-mortem was made at once and a cyst as big as a large nut was found in the walls of the left ventricle. Those were very much reduced in thickness, and the interventricular septum likewise. The lungs and the liver contained similar cysts, acephalocysts, readily recognized with the microscope. With the exception of the diseased parts, the carcass was allowed to be used.—(*Il Nuovo Ercolani.*)

SUCCESSFUL VAGINAL HYSTEROTOMY (*By Dr. Gallo Zoroastro*).—A primipara cow was suffering since 24 hours with labor pains. She was still standing, but manifested continually excessive, violent, expulsive efforts. A vaginal examination revealed a contraction of the os, which felt like a hard tumor, as hard as wood. The contraction of the os was such that one finger could scarcely be introduced and the body of the fœtus just felt. The case was very critical, and notwithstanding continuous irrigations of warm water, which had sometimes given good results to the author, he had to resort to hysterotomy to remove the fœtus. To this effect he introduced his finger through the os and drew it strongly towards the vulva, when it was taken hold of with a sharp hook and pulled by an assistant. With a blunt bistoury introduced then through the os, it was divided upwards and sideways to the left in its whole thickness. The hand could then be introduced into the uterus, the envelopes ruptured and the fœtus removed alive. It, however, died soon after. The cow was much exhausted after the operation. She was given drenches of good hot wine, and her utero-vaginal passages were irrigated with warm solution of corrosive sublimate. The next day the animal was comfortable, her appetite good, temperature normal, and no trouble was manifested from the operation. Although the author has already performed

this operation in other cows, he has not had as good a success, the animals having died with metro-peritonitis.—(*Chinica Veterin.*)

AMPUTATION OF AN EVERTED UTERINE HORN [*By Dr. Gallo Zoroastro*].—The author was called to attend a cow which had calved 48 hours before, and by violent expulsive efforts had brought about a prolapsus of the uterus. He found the right horn protruding with two lacerations measuring about 10 centimetres in length. The cause of these lacerations could not be found out, as by the report of the owner the cow had calved without assistance, and no one had attempted to reduce the prolapsus. The case was serious, the organ being much swollen; there was much infiltration, and the parts were threatened with gangrene. Reduction being impossible, it was decided to resort to amputation. A strong ligature, previously boiled, was applied tight on the tumor near the place where it protruded through the vulva, and involving healthy structures, when the other part was amputated. There was no hæmorrhage. The uterus was returned to its normal position, and repeatedly disinfected by irrigations, with substantial diet. For a few days the appetite was gone, the milk arrested, but soon returned, and complete recovery took place.—(*Clinica Vet.*)

SOCIETY MEETINGS.

VETERINARY MEDICAL ASSOCIATION OF NEW JERSEY.

The semi-annual meeting was held at Stetter's Assembly Hall, 844 Broad Street, Newark, on Thursday, July 11th.

Preceding the regular meeting a clinic was held at the hospital of Dr. Werner Runge, 130 Union Street, Newark, and was under the management of Drs. Runge, McDonough, Hogan and Hopper. Much credit is due the members of this committee for the excellent clinic planned and executed by them. Although the attendance was large, the spacious quarters furnished by courtesy of Dr. Runge proved ample for all requirements. Dr. Runge presented two cases, one of osteo-porosis, an aggravated case upon which he had experimented with good results, and another of cancerous growth of horse's head. Dr. McDonough gave a practical demonstration of the use of stocks. Dr. Miller, the experienced and expert ridgling castrator, performed the operation of castration with the subject in a standing position. Dr. McCully, of New York, with the assistance of Dr. Hopper, performed caudal tenotomy upon several subjects. Dr.

McCully is an expert in this line of surgery, and the transformation which he wrought upon several difficult cases was a revelation to the attending surgeons. The committee on clinic for the Atlantic City meeting is fortunate in securing Dr. McCully for an operation.

The regular meeting was called to order at 12.30 by the President, Dr. Wm. Herbert Lowe. Thirty-five members responded to roll-call, and two members were proposed and elected to membership.

Dr. T. E. Smith, of Jersey City, rising on a point of privilege, presented to Dr. Lowe, on behalf of the association, a handsome gavel, neatly and appropriately inscribed. Although completely taken by surprise, the President replied to the courtesy of his fellow-members in a fitting manner.

It was voted that the Committee on Legislation be authorized to take legal action against those in the State who have registered illegally or are practicing without regard to the law, and it is probable that the act to protect the title of veterinary surgeons and to regulate the practice of veterinary medicine and surgery in New Jersey, approved March 4, 1889, will be thoroughly tested in the near future. It was voted that a committee be appointed to draft resolutions expressing the satisfaction of the association for the noble efforts made by the workers for the Army Legislation Bill.

Voted that the Chair appoint a press committee.

The report of the Animal Industry Committee was given by the Chairman, Dr. J. Payne Lowe. Report of the Committee on Legislation was read by the Chairman, Dr. T. Earle Budd. Report of the Public Health Committee was given by Dr. Werner Runge, Chairman. Drs. Magill and Wm. Herbert Lowe, delegates to the meeting of the Pennsylvania State Association, made their report. The Treasurer's report showed the treasury to be in a satisfactory condition.

A paper, entitled "Argentum and Its Preparations; Their Value in Veterinary Practice," was read by Dr. Ancker.

A paper was presented by Dr. Pope, the subject being "Insects in their Relation to the Practice of Veterinary Medicine and Surgery."

The committee on arrangements for the Atlantic City meeting reported the need of more funds, and it was voted that a committee of one from each county of the State be appointed to solicit and collect from veterinarians. The committee of arrangements, consisting of Dr. A. T. Sellers, Chairman, Drs.

J. O. George, E. L. Loblein, J. P. Lowe and Wm. B. E. Miller, was accordingly augmented by the following: Drs. T. Earle Budd for Essex Co., T. E. Smith for Hudson Co., J. Payne Lowe for Passaic Co., G. F. Harker for Mercer Co., Chas. E. Magill for Camden Co., J. B. Hopper for Bergen Co., James M. Mecray for Burlington Co., Wm. Gall for Monmouth Co., E. L. Loblein for Middlesex Co., James Mosedale for Morris Co., E. R. Voorhees for Somerset Co., Whitfield Gray for Sussex Co., F. A. Zucker for Union Co., and J. M. Everitt for Warren Co.

It was voted that the next regular meeting be held at Trenton, exact place of meeting to be announced later.

GEORGE W. POPE, *Secretary.*

NIAGARA AND ORLEANS COUNTIES VETERINARY MEDICAL SOCIETY.

The annual meeting was held in the Court-House, Lockport, N. Y., August 16th, when the President, Dr. Stocking, in a few well-chosen remarks called the meeting to order, which was the largest and most interesting in the history of the society.

The prosecuting committee reported having given Mr. Perry, of Pekin, notice to comply with the law in relation to practicing; said Perry agreed to remove his sign and refrain from further practice. Several cases of the same nature were reported and turned over to the committee with power. The Secretary reported Mr. Mattison, of Niagara Falls, having settled the penalty recovered against him for illegal practicing.

The Treasurer's report showed the Society was in a flourishing condition financially.

Dr. W. E. Stocking read a paper on "The Veterinarian and Profession." Dr. M. D. Williams read on "Milk Fever"; and Dr. J. O. Moore read on "Open Joint." All the papers were well received and drew forth considerable discussion, which was of more than ordinary interest.

The following officers were elected for the ensuing year:

President—W. E. Stocking, Medina.

Vice-President—M. D. Williams, Middleport.

Secretary-Treasurer—Anderson Crowforth, Lockport.

Drs. J. O. Moore, Wilson; J. T. Liddle, West Shelby; G. C. Kesler, Holly; N. Hoffman, Lockport; and Wm. R. Hunter, of Niagara Falls, N. Y., were elected Censors.

Meeting adjourned to meet in Medina in February, 1902.

ANDERSON CROWFORTH, *Secretary.*

NEW YORK STATE VETERINARY MEDICAL SOCIETY.

The REVIEW gave a very full list of papers to be read and operations to be performed at the meeting of this society, which occurs at Ithaca on the 10th and 11th inst. While the programme as given then was a certain guarantee that this year's meeting is to far excel in interest, value and attendance all others in its history, we have received notification of the following additional papers:

"The Tuberculin Test as a City Health Ordinance," Dr. C. H. Jewell, Dunkirk.

"Fracture of Tibia," Dr. E. H. Nodyne, Sodus.

"The Influence of Altitude on the Results of Surgical Operations," Dr. J. A. McCrank, Plattsburgh.

"A Peculiar Affection of Cattle," Dr. W. H. Phyfe, Delhi.

"Rectal Manipulations," Dr. J. W. Corrigan, Batavia.

"Bob Veal," Dr. W. H. Kelly, Albany.

"Rabies," Prof. James Law, Ithaca.

Veterinarians in attendance upon the meeting of the A. V. M. A. are cordially invited to extend their trip to Ithaca. This arrangement will be especially convenient for those who purpose visiting the Pan-American Exposition.

NEWS AND ITEMS.

DR. W. L. WILLIAMS, of the New York State Veterinary College, spent his vacation at his old homestead in Argenta, Ill.

WE regret to hear of the serious illness of Mrs. H. D. Gill, of New York, from appendicitis.

DR. J. E. RYDER'S San Toy obtained a red ribbon in the saddle class at the Bayshore (L. I.) horse show, Aug. 10.

DR. J. F. DEVINE, of Rhinebeck, N. Y., has recovered from a serious attack of appendicitis.

DR. E. A. A. GRANGE is now located in New York City, associated in practice with Dr. F. C. Grenside.

DR. WALTER SHAW, of Dayton, Ohio, has been appointed a member of the Ohio State Board of Veterinary Examiners.

DR. H. L. RAMACCIOTTI, of Omaha, Neb., has opened a hospital at 856 South 28th Street, that city.

DR. WM. HERBERT LOWE, Paterson, N. J., and Dr. T. Earle Budd, Orange, N. J., have been appointed Good Roads Commissioners by Governor Voorhees.

DRS. W. H. HOSKINS and R. S. Huidekoper have formed a practice co-partnership with headquarters at 3452 Ludlow Street, Philadelphia, Pa.

DR. W. A. SAVAGE, graduate of Chicago Veterinary College, class '95, spent several months relieving inspectors at western stations, during their vacations.

DR. ROBERT JAY, who was with the Bureau of Animal Industry at Kansas City during part of the year, was assigned to Chicago. Dr. Jay was formerly from Davenport, Iowa.

DR. TAIT BUTLER, recently State Veterinarian of Kansas, has accepted a similar position in North Carolina and will organize a veterinary department to the State University. His headquarters will be at Raleigh.

DR. H. G. MOORE, graduate of Veterinary Department of Iowa State College, who was in charge of the microscopic work of B. A. I. at Kansas City, has been transferred to Chicago, Ill.

DR. W. H. MCKINNEY, inspector B. A. I., graduate of Chicago Veterinary College, class '88, was assigned to duty at Kansas City, after serving over one year at Chicago in the capacity of meat inspector. Dr. McKinney is a member of Chicago Veterinary Association, and a good industrious inspector.

CIRCULAR NO. 35, Bureau of Animal Industry, just issued, treats of roundworms in sheep, goats, and cattle, and outlines treatment for their destruction by various drugs in drenches. Dr. Ch. Wardell Stiles, the zoölogist of the bureau, is the author.

TUBERCULOSIS IN A SNAKE.—The daily press of August 14 gave an account of the putting to death by chloroform in the Academy of Sciences, Lincoln Park, Chicago, of a large African boa constrictor, which had been sick for two years, and which had not tasted food for three months. At the post-mortem tuberculosis of the bronchial glands, lungs and liver was found.

SOME practical points for veterinarians are contained in the article on "Electrocution in Horses" contained in this number. In the cities so many accidents occur to horses through the electric currents used in propelling street cars that veterinarians should be posted upon the effects of electricity both in the subject and in the cadaver.

DR. W. W. WORCESTER, of the class of 1900, Veterinary Department of the Ohio State University, who has been with the Bureau of Animal Industry at Chicago, Ill., during the past year, has been transferred to Salt Lake City, Utah. He is a

member of the Chicago Veterinary Association, and left the city with the best wishes of every veterinarian who knew him.

A NEW CANINE TABLET.—At the suggestion of Dr. Robert W. Ellis, of New York City, the Abbott Alkaloidal Company have placed on their list a one-grain aloin tablet. The doctor, who has made a study of alkalometry in canine practice, says that the dose to produce catharsis is from one to two grains, and that the $\frac{1}{8}$ and $\frac{1}{12}$ grain tablets require too much administration.

NEW YORK CITY VETERINARIANS were never so busy as during the summer of 1901. After the influenza and heat prostrations, purpura hæmorrhagica was very prevalent. It was the experience of many in this latter disease that a lung full of pure air was better than a stomach full of medicine. Removal from unsanitary stables to the air and grass of the field will save these patients in the great majority of cases.

DR. FRANK H. MILLER, of New York, removed two tumors from the fore feet of the large alligator "Big Mose," Aug. 9, at the Zoological Garden, after a struggle in which it required eight men and many yards of strong rope to confine him. Even bound securely thus the patient would jerk his legs away as the operator would attempt to inject cocaine, so that it was found necessary to place him under chloroform anæsthesia, it requiring three ounces to accomplish this.

A PHYSICIAN NOMINATED FOR MAYOR.—Dr. Edward F. Brush has been nominated for mayor of Mt. Vernon by the Republican City Convention. Dr. Brush was the first mayor the city ever had. He was elected in 1892, and made an excellent official. There was a general demand for his renomination ever since, but he has always declined. Dr. Brush was for several years professor of cattle pathology at the American Veterinary College.

DR. D. E. SALMON, Chief of the Bureau of Animal Industry, in an interview in the New York *Herald*, is sure Prof. Koch is wrong in his conclusions before the London Tuberculosis Congress. Prof. James Law, director of the New York State Veterinary College, is of the same opinion. The venerable scientist, Prof. Virchow, takes decided issue with Koch. It may be stated that medical Germany and England are solidly against the Koch theory.

DURING THE RECENT HOT SPELL, "Zenoleum," that most excellent antiseptic, prepared by the Zenner Disinfectant Co., Detroit, has proved a balm to the bruised and abraded surfaces inflicted upon animals that have suffered from heat prostration,

and lain for variable periods upon the pavements of the city streets. Sponged off with a pailful of an emulsion, made by adding a small quantity of "Zenoleum" to a pail of cold water, the animals seem refreshed, the tumefactions subside, and the abrasions dry up.

DOUBLE IMPREGNATION.—A story alleged to be true comes from Missouri that on April 28 last a cow gave birth to a calf showing forth unmistakable evidences of Short-horn ancestry. May 24, or less than thirty days later, the same cow brought forth another fully developed calf, showing as unmistakably that it had been begotten by a Hereford bull. The owner of the cow and calves is said to be the cashier of a bank, who personally vouches for the transaction all around. He relates that last season the cow was bred to a Short-horn bull and later pastured in a field where a Hereford bull ran with the cows.—(*Breeder's Gazette.*)

MINNESOTA MATTERS.—At the meeting of the Minnesota State Board of Health, July 10, 1901, Dr. S. D. Brimhall was chosen director of the Veterinary Department. Since the transfer of this department to the office of the State Board of Health, August, 1900, Dr. Brimhall has been performing the duties of director although not bearing this title. Various rules were presented to the board looking to the prevention of the importation of animals suffering from contagious diseases, such as tuberculosis, glanders, sheep scab, etc. A very interesting report from Dr. S. D. Brimhall of the Veterinary Department and Dr. L. B. Wilson of the Bacteriological Laboratory of the board was presented upon 64 cases of hæmorrhagic septicæmia in cattle.

THE GASTRIC JUICE OF THE DOG AS A REMEDY.—Dr. Frémont, of Vichy, has given the name *gastérine* to a preparation made from the gastric juice of the dog, obtained through a gastric fistula established for the purpose. At a recent meeting of the Medical Society of the Hospitals of Paris (*Gazette hebdomadaire de médecine et de chirurgie*, July 4th) M. Mathieu reported having observed great benefit and occasionally "veritable resurrections" from its use in cases of dyspepsia. Some of the patients had been so cathectic as to lead to the suspicion that they were cancerous. The gastric "chemism" continued faulty, but the patients were benefited in some unexplained way. Another speaker said that quite the same effects were produced by the use of hydrochloric acid.

VETERINARIANS NEEDED FOR THE U. S. ARMY.—There are now twenty-one vacancies in the office of veterinarian, U. S. Army, and four more will occur in the near future. Veterinarians are required for service in the cavalry and field artillery. They are allowed the pay and allowances of a second lieutenant of cavalry—$1500 per annum with 10 per cent. increase for each period of five years' service up to twenty years and quarters. They are not commissioned officers, but wear the uniform of a second lieutenant without the shoulder straps. It is the intention of the War Department to hold a competi ive examination at an early date for the purpose of filling the vacant places, and any one desiring to take the examination should make application at once to the Adjutant General of the Army, Washington, D. C. Applicants must be citizens of the United States, not less than 22 nor more than 35 years of age; must be graduates of some recognized veterinary college; must be of good moral character and physically sound. They will be required to pass a written examination in the following subjects: *Basis Examination*—English grammar, arithmetic, geography, history. *Subject Examination*—Anatomy and physiology, pathology, practice of medicine, descriptive and operative surgery, materia medica and therapeutics, sanitary medicine, conformation of the horse and examination for soundness, horseshoeing, meat inspection, veterinary hygiene, general feeding and watering, stabling and care of animals in garrison and field, saddling, bitting, packing, etc.

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AUGUST, SEPTEMBER AND OCTOBER, 1900, REVIEWS WANTED.

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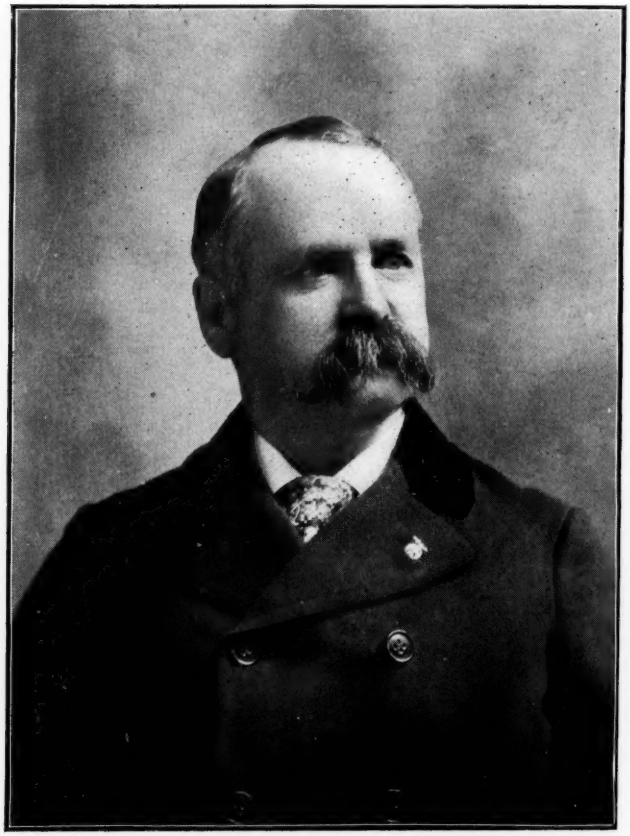

DR. J. F. WINCHESTER, of Massachusetts,

PRESIDENT OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION, 1901–1902.

AMERICAN VETERINARY REVIEW.

OCTOBER, 1901.

All communications for publication or in reference thereto should be addressed to Prof. Veranus A. Moore, Cornell University, Ithaca, N. Y.

All communications for publication or in reference thereto should be addressed to Prof. Charles B. Ball, Seventh Ave. & Union St., Borough of Brooklyn, New York City.

EDITORIAL.

PRESIDENT McKINLEY.

While bowing in humble submission to the will of the Great Ruler of the Destinies of Nations, we acknowledge our utter helplessness to fathom the inscrutableness of the divine motives in His removal of the beloved President of the United States—that man among men, that God-fearing, sagacious, upright leader of a great people, who had accomplished so much for the cause of the Creator and his fellowman. Prostrated by this additional evidence of His wonderful wisdom, we can only exclaim: "Thy will be done."

EUROPEAN CHRONICLES.

ROUX AND NOCARD.—Everybody is out of town. Societies, medical or veterinary, have suspended their work; meetings are adjourned, and until October, when having recuperated strength by rest in the country or on the seashore, in the mountains or at the watering places, the scientific world will once more set to work, little news can be looked for in our "Chronicles," and for that account this installment will be short.

It is not, however, that nothing more can be said of past events, and certainly subjects which we have already alluded to are not without offering room for further consideration. For instance, I was just looking into the *Semaine Medicale*, and my attention was attracted to the late English congress by the title of